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CONTENTS.

PAGE

The 4th Annual Meeting.—The President and Secretary's Reports,—Election of Office-Bearers,—Change of Name,—Ladies' Subscriptions,... ... 1-10

1st Monthly Meeting.—Minutes read and approved,—Change of Society's Name, Constitution, and Rules,—Paper on Noxious Insects, by Mr M'Dougall,—Various Exhibits and Remarks, ... 10-17

2nd Monthly Meeting.—Minutes read and approved,—Dr Galbraith's Paper on Parasitical Fungi on Man,—Miss MacLagan's on Rubbings on Sculptured Stones and Crosses of Islay, read by Mr D. Chrystal, ... 17-38

3rd Monthly Meeting.—Minutes read and approved,—Paper by Rev. R. Paul, F.S.A., Scot., on Shell Middens, &c., on Tents Moor, Fife, Shells and Flints from Tents Moor, and Token and Letter of Rev. A. Henderson of Leuchars, exhibited, ... 38-46

4th Monthly Meeting.—Minutes read and approved,—Paper by Mr Cook, on the Stirling Guildry Ring,—Chain of Office, Medal, and Ring, and a selection of objects from Tents Moor exhibited,.. 46-62

5th Monthly Meeting.—Minutes read and approved,—Excursions to Larbert, Torwood, and Lochleven announced,—Paper by Mr M'Dougall, on Rare Plants of the District,—by Mr Croall, on Life and Transformations of Insects,—Notes on Shells of Ancient Sea Beach,—Curious Stone Axe Head, from Mr George Pollock, exhibited,.. 62-74

PAGE

6th Monthly Meeting.—Minutes read and approved,—Members elected,—Committee appointed to meet the Geological Societies of Edinburgh and Glasgow,—Paper by Dean Shearer, on John Cowane's Chest,—by Mr D. Chrystal, on Scotch Ecclesiasticism at the time of the Union,—Exhibits, Dandelion flowers with branched stems,. 74-98

7th Monthly Meeting.—Minutes read and approved,—agreed to accept custody of Macfarlane Museum, and to apply for Gilchrist Lectures for 1884-5,—Paper by Mr Moyes, on the Visit of the Edinburgh and Glasgow Geological Societies, and by Mr Croall, on that of the Edinburgh Natural History Society, to Stirling,—Excursion to Alva and Menstry Glens,... 98-107

5th Annual Meeting.—Minutes read and approved,—Election of Office-Bearers,—President's Annual Report (arrangement of Collections, Local Flora, &c.),—Secretary's Report, Meetings, Membership, Excursions, Property and Custody of Macfarlane Museum,—List of additional Stirling Plants, ... 107-117

STIRLING NATURAL HISTORY AND ARCHÆOLOGICAL SOCIETY.

The fourth annual meeting of this society was held in the Smith Institute, on Tuesday, 7th Nov, 1882. Mr Croall, the president, occupied the chair; there was a meagre attendance of members, only about a dozen being present. After the minutes of last meeting had been read over and approved of, the President proceeded to read his annual address. Mr Croall's paper was as follows:—Another year has passed away, and other twelve months have to be numbered with the past; and I am sorry to say that I have to regret that these months have not had to record so much progress in furthering the object of our Society as I could have wished, and that, in consequence, my address to you on the present occasion will be much shorter, and it may be so much less interesting than it would have been otherwise. Although less, however, has been done than we could have wished, yet the time has not been altogether lost, not even altogether unimproved, and in order to see exactly what has been done, let us glance for a little at the various objects which we had in view at the commencement of the year. One of these, and perhaps not the least important, was and is the hope of awakening and diffusing a greater taste for the study of Archæology and of Natural History among our fellow-townsmen and of thus supplying them with the means of occupying a leisure hour in a remarkably enjoyable and instructive employment, when time might otherwise hang heavy on their hand. If you look at the numbers that have attended our meetings, and at the list of members on the roll, we think that our hopes on this point have not been altogether unfulfilled. No doubt, a few have had to withdraw, but their places have been more than supplied by others, and many of them more or less actively engaged in furthering the objects of the Society in some way or other; and although business with us all has its stern and peremptory demands, which neither can or ought to be put aside, yet every one has now and again more or less of a "leisure hour," and it is always well if he has something, which cannot be called business, and which may lead the mind in a direction different from his business, with which he can agreeably fill it up. The fact that there are now, and chiefly among the members of

the Field Club, upwards of twenty microscopes, in occasional, if not in constant and active operation, whereas, before the commencement of the club there were not more than five or six, is a rather significant evidence in that direction. Shall we be allowed also, to count among the signs of the times in its favour, that one section of the members, and shall we characterise it as the "better half," has been urging its claim to be permitted, more substantially, to contribute to its support. Surely this at least is more encouraging than if we were told that it did not deserve their countenance. It is much to be regretted that the excursions have this season been so unsuccessful; in part, no doubt, owing to the weather; but, in part, also, owing to several of the members, who usually took part in them, being otherwise engaged; and unavoidably prevented from joining them. That the excursions, in themselves, have not essentially failed in their attractions, appear from the fact that nearly thirty members appeared at the station at the June excursion, but, as it was raining in torrents, only one-half had courage to proceed, and although these had rather an enjoyable day in examining the Archæology of the district, the day continued too wet for any out-door enjoyment or research. This was the only excursion at which I even attempted to be present, and for any additions that have been made to the Botanical Department, we have been mostly indebted to the ladies. With all these drawbacks, however, some five or six new species of flowering plants have been added to our local list, and several new localities for rarer species. This is, by no means, unsatisfactory, when it is remembered, that any additions now likely to be added, must be considered rare in the district. Still, there are no doubt, many varieties, and many new facts connected with the distribution of species, which would well reward a careful and diligent research, still unrecorded, and it is hoped that the coming season may be more favourable and more fortunate, and that more progress will have to be recorded in the various sections of our work. In the Geological Section, the members in charge of that department have not been idle, and good work has been accomplished. We had hoped too that the results of their labours would have been laid before you before this time, but they have not seen their way to this desirable end; we trust, however, that before another season has passed, they will be able to put you in possession of some interesting

details connected with the Geology and Fossil Fauna and Flora of the neighbourhood. Our Entomologist, Mr M'Dougall, has been keeping his eyes about him, as usual, in this all but boundless field of observation, and has made a beginning—having collected nearly forty species of beetles. Some of our microscopical members have fairly set to work among the Freshwater Algœ or water-weeds, and our local diatoms will, ere long, present a goodly catalogue. I had fully intended this season to have devoted my attention chiefly to the mosses, but the circumstances to which we have already alluded, entirely prevented me, and for the same reason the lists of additional species have not been got ready for the volume of our transactions just completed, but they will be made up and laid before you as time permits in the course of the coming session. There is still one other subject on which I ought to say a few words, and they shall only be a few. It is the changes proposed in the name and working of our Society. This subject has been pressed upon the attention of the Society at the present time, no doubt with the sincere intention of benefitting the institution, although on this point we may not, under present circumstances, be all at one. It has been suggested that the influence of the club is too much localised—that were its field of operation widened, it would receive much more extensive support, and its influence would be proportionally extended. Now, I may remind you that we started with the principle, long since recognised, that local museums ought to make local interests the first and chief object of their attention; that this principle is a correct one, we are satisfied that the success of the club hitherto fully confirms. It may be urged, however, that having done so well within its narrow sphere, it may be *now* high time to give it a wider range and more extended influence. This may be all true, but it must be also remembered that a wider field requires more labour or greater energy to effect the same results, and that unless we can secure more labourers in the field or more activity among the workers, the wider field may be worse cultivated, and the harvest less abundant, than in the narrower sphere. No doubt if the results promised could be, even in part, realised, the general good would be vastly increased, and local interests lose nothing, but share a proportionate benefit. The first step in the duty of the Field Club, should this change be adopted, would be to make it clear that their object is a public, and

not a private one, and that the specimens and cases so obtained will be recognised as inalienable public property, of which they, as an association, are only the guardians. If such an idea was carried out, and proved successful, there can be no donbt but that the benefit would be considerable, not only to the visitors to the museum, but to the town at large. I have still another subject to introduce to your notice, but I hardly know under what head to describe it; the objects are neither Greek, Roman, nor Etruscan; Majolica nor Staffordshire ware; neither is it from Egypt, China, or Japan. Still they are curious and interesting; and as the objects were lately put into my hands with a view to exhibit them to the club, I shall do so, and give you whatever fragments of their history I have been able to collect. The specimens exhibited are only part of the set: they are said to have been found when making a large drain from the town of Stornaway to the sea for the purposes of drainage, and were found at no great distance from the sea, probably within high-water mark; this I was anxious to ascertain, as the curious glazing seemed as if it might be result of the influence of the salt water; appearing like a limey incrustation like coral, or the crustaceous base of the calcareous Algae. They were brought south and kindly handed in for your inspection by Mr Young, son of Mr Young of Keir. Since then I have been able to glean a few facts which may serve to throw some light on their history. That they are of modern make there can be be no doubt, as tea was only introduced into this country at a recent date, and some curious anecdotes are told of the early methods employed in bringing it into use, when a package of it was brought home and presented as a great rarity to our grandmothers in times now all but forgotten,—such as boiling the leaves and serving them with butter, with a pinch of mustard as a relish. It would be some time after this date, however, before tea would become a common beverage, even here, and years would likely elapse before it succeeded to make its way into the Hebrides, and still later before it would become so common as to induce the manufacture of the necessary dishes. At first, and even in my early days, the luxury of a handle to the cup was a thing unknown, at least in common use, for I can well remember the very great interest and curiosity that was excited when my mother brought home the first set of teacups with handles. I can well remember also how unhandy were those pre-

viously in use when lifted between the two fore-fingers and thumb, especially if the tea happened to be more than usually warm. This brings down the manufacture of the specimens before us to a very recent period, to a time indeed not more than forty years ago; and perhaps not even half of that time, so that their value does not depend at all on their antiquity. Since these came into my possession, too, I have learned that the manufacture of a similar article is carried on in Skye, and that a woman there has been engaged in the manufacture for some time with no small amount of success, and that a kind of clay is found in that island peculiarly fitted for the purpose. It is quite possible that a similar clay may be found in the Island of Lewis, where these were obtained. I have also learned that a splendid work, beautifully illustrated, has been lately published on this and kindred subjects, but I have not been able to see it, as it is very scarce, having been only published for private distribution, and not for sale. I shall be glad, however, if I happen to come across any further information on the subject, to place it at your disposal. You will thus see that the objects before us have no claim on the veneration of the antiquary. They are interesting nevertheless, and give us some insight into the facility with which in more ancient times objects of a similar kind were manufactured. The other subject to which I would wish, and still more briefly, to refer, is the payment of a subscription by the lady members. This subject was carefully and thoroughly discussed by the Council at the commencement, and would not have been again revived had it not been pressed upon their consideration, and being so, they had no resource but lay it before you, and leave it to your own decision. In doing so you must not forget that the labours of your secretary and treasurer are already considerable, and that they are also entirely unremunerated, and that their work would, were this proposal adopted, be greatly increased, but without much real benefit to the Association; and although the burden of the old song may be

> "Nought's to be made at woman's hand
> Unless ye gae her a' the plea,"

yet we do think that on the present occasion, we must beg to vote against the motion, and stand to our gallant colours, and hope they will not desert us even if it should be decided to have a new name, and more rivals in their favour. We have been much indebted to the ladies, and

we have no wish to lose either their good graces or their good services, and we hope that under new auspices these will not be withdrawn. There are many ways in which they can bear a helping hand in working out the various objects which the association has in view; for their assistance in the past we most cordially thank them, and for their countenance and support in the future, we promise them no less cordial and grateful acknowledgements. One word more and I have done. Much has been said on the subject of *Localising* the influence of the Field Club, but my decided conviction is that it has not even a fair chance of gaining the full benefit of more extended influence as long as the society persists in localising its management, and especially the presidency.

Mr MOYES, one of the secretaries, gave in his annual report. He said—In presenting the fourth annual report of the Stirling Field Club, your secretaries have no little difficulty in finding matter that will prove interesting without referring to what most of the members are already familiar with. The past year has been characterised by regular and steady work, more than by any startling discoveries. The plan of having a syllabus, begun last year, has been found to be an advantage, as it insured some leading paper for each night of the session. The papers have been of more that usual interest, and the members who have been present at the meetings have, as a rule, had both pleasure and profit. We may consider the work of the club under these four heads (a) meetings; (b) membership; (c) excursions; (d) property. *Meetings.*—During the session there have been ten ordinary meetings. At nine of these papers have been read on a great variety of subjects—Botany and Archæology occupying the chief place. However, the papers and reports have all been contributed by our own members with one exception — that on "Ancient Masons' Marks," by the Rev. Mr Paul of Dollar. From the lady members we have only received one short paper during the past year, making the second contribution from the ladies since the beginning of the club. This, we are sure, is not from any lack of interest or want of power. It may be that the Council have been rather remiss in asking the ladies to write on some of the subjects they feel interested in, but I am certain that we will heartily welcome any papers from our lady members during the coming session. At the January meeting no papers were read, but

there was instead a most successful microscopic exhibition. It was a very enjoyable meeting, and afforded much interesting information. There was a very large attendance of members and friends; and while many admired the various objects placed under the microscopes, of which there were about twenty, most of them belonging to members of the Club, others were attracted to the cases containing the shells and fossils, and the plants and sea-weeds, so carefully prepared and mounted by our President. The average attendance at the meetings of the past year has been better than in any previous year of the Club's history, being something over 50. The ordinary meetings do not by any means represent the amount of work done by the Club. The members of Council met once a month—indeed some months there have been two or three meetings—to arrange for the ordinary meetings and to discuss other matters on which the success of the Club depends. This year these discussions have been more frequent than usual, owing to the proposals made by Mr Murray of the Macfarlane Trust. The interests of the club are being carefully considered, and the members may rest assured that no engagements will be undertaken which may prove detrimental to its usefulness. The papers and reports read during the past year will appear in the Transactions, copies of which will, it is hoped, be ready for the members at the next meeting. Their appearing in this form renders it unnecessary to mention or classify them at any length, and those desirous of further information regarding them, will find it in the Transactions. As the number of copies printed this year is not much more than half that of former years, early application will be necessary. *Membership.*—The membership of the club still continues in a satisfactory state. Many new names have been added during the past session, while some have withdrawn, either through removal from the district or through lack of interest in the work. While the club continues strong in numbers, there is still a want of interest in its practical work. It would be well for its prosperity were a large number of the members to devote themselves to some particular branch of investigation. Members who wish to take up botany and geology, or any of the other branches, will find much to help them in their study both in the collections and books belonging to the club. *Excursions.*—The excursions have unfortunately been rather unsuccessful this year. Many things have come in the way to prevent members

from going, and it becomes a question whether the drawing up of a programme of excursions is the most suitable way of making them successful. Perhaps it might be better to select a number of places to be visited, and at an ordinary meeting make arrangements as to hour and place of starting, such as would suit the majority of members. This would at least keep before them the fact that we have excursions in connection with the club. We must not forget that our proper work lies in the field, and that the excursions give us the opportunity of doing that work. *Property.*—It has been remarked that no club like the Field Club can exist for many years unless it becomes possessed of some property—something tangible to show that it really exists. The property of the club is gradually assuming respectable proportions. We have now two cabinets, one case, and four tables, while as the nucleus of a library we have seven volumes, which are of great value, and are not usually found in libraries. The books are, of course, open to the members at any time on application to Mr Croall. During the year Mr John Shearer, who had been elected one of the joint secretaries at last annual meeting, was obliged to resign owing to his leaving town. The Council were, however, very fortunate in inducing Mr Whyte to undertake the duties of the secretary during the remainder of the session. It now only remains for me to convey to the trustees of the Smith Institute our hearty thanks for the use of our meeting place, and also for giving us space for our cabinets and cases.

The report was adopted.

OFFICE-BEARERS.

The meeting proceeded to the election of office-bearers, and to fill up vacancies in the council—President, Mr Croall; Mr R. S. Shearer, treasurer; Mr Moyes and Mr Whyte, secretaries; members of Council—Rev. J. E. H. Thomson, Mr Gentleman, Mr A. F. Hutchison, the latter to serve two years.

On the motion of Mr Moyes, a vote of thanks was passed to the retiring members of council—Dr. Galbraith, Rev. D. D. Ormond, and Mr Nicholson.

CHANGE OF NAME.

Minutes of meetings of the Council were read, recommending that, in deference to a suggestion by Mr Murray of Edinburgh, the name of the institution should be altered so as to indicate a greater scope of work and that it be known in future as the Midland Counties Natural History and Archæ-

logical Society. Mr Moyes moved that the recommendation of the Council be adopted, and in support of his motion said that the Council had been in communication with Mr Murray, from whom they had received several valuable suggestions as to extending the influence of the club. In deference to these, members of council had talked the matter over, and many of them had come to see that a change of title would be beneficial. The next question was—what was the change to be? The name "Stirling Field Club" was thought to be too much of a local term, and looked as if it referred to a private meeting of a few individuals. If a new name was to be given to the club, it should be such a name as would allow them to invite gentlemen in the district round about to become members and to subscribe to the funds to support a large museum for the district round about.

Rev. J. E. H. THOMSON, did not favour changes whose object was not really beneficial. A change of name was not in itself hurtful, but the name chosen by the mover of the motion had the disadvantage of being too long and cumbrous. He did not see that it would be more impertinent to ask people from Clackmannan, Kinross, or Perth counties to join the society under the old name than under the one now proposed—one was a name having reference to a centre, the other to a circumference. He moved that there be no change in the name.

Dr GALBRAITH deprecated dropping the name "Stirling" from the title of the club, and assuming such a high sounding name as that of Midland Counties, which was one, he thought, the society had no right to. After some discussion, Dr Galbraith moved that the name be the "Stirling Natural History and Archæological Society."

Rev. Mr GOLDIE suggested that the name be the Stirlingshire Society of Natural History and Archæology.

On the President proceeding to put the motion and amendments to the meeting, a long and desultory discussion took place as to whether ladies should vote or not. Ultimately the vote stood between Mr Moyes' motion and Dr Galbraith's amendment. On a show of hands being taken, the amendment was carried by 11 to 4.

LADIES SUBSCRIPTIONS.

A recommendation by the council, on a remit to them to report on a proposal that lady members be

charged a small annual subscription, was read to the effect that no subscription be charged, but that they be allowed to sit, speak, and vote as hitherto.

Mr MOYES moved the adoption of the recommendation, and that the lady members be ranked as "honorary" members.

Dr GALBRAITH moved that an annual subscription of one shilling be charged. He thought this would give the ladies a deeper interest in the proceedings. Many ladies were members and never attended the meetings. He considered it extremely unsatisfactory to have so many phantoms on the roll (laughter). One lady would meet another and ask —Are you a member of the Field Club? "Oh yes", she would answer, "but I never attend; I never was there in my life." (Renewed laughter). If this sort of thing went on the society would soon go down.

The PRESIDENT pointed out that the imposition of this new subscription would double the work of the treasurer.

Dr GALBRAITH said Mrs Hogg would undertake to collect the ladies' subscriptions. (Hear, hear.)

On a vote being taken, the proposal to charge an annual subscription of one shilling was carried by a large majority.

Mr GOLDIE moved that it be remitted to the Council to revise the rules and constitution of the society in accordance with the alterations now approved of, which was agreed to, and the meeting stood adjourned to enable the Council to report.

The usual monthly meeting of the Stirling Natural History and Archæological Society was held in the Smith Institute on Tuesday, 5th Dec.—Mr Croall, president, in the chair. Owing to the inclemency of the weather and other causes, there was a poor attendance of members. After the minutes of the former meeting had been read and approved of, Mr Moyes announced that the council had recommended that the following changes should be made in the rules of the society. 1. That the society shall hereafter be known as the *Stirling Natural History and Archæological Society.* 2. That the objects of the society shall be to explore the district for the purpose of inquiring into its geology, botany, natural history and archæology, *and to form and take the custody of specimens and form a reference*

library. 3. That the society shall consist of ordinary, honorary, and corresponding members and *lady associates*, &c. 4. That the office-bearers shall consist of a president, two vice-presidents, treasurer, and secretary, or two joint-secretaries, who shall be elected annually *from the ordinary members*, &c. 5. That the annual subscription shall be 5s for ordinary members, and 1s *for lady associates*, and shall be payable at the annual meeting, &c. 6. That the ordinary meetings shall hereafter be held on the first *Thursday* of every month except July, instead of the first Tuesday as heretofore. 7. That any member may introduce *friends* to meetings or excursions. These changes were all agreed to by the meeting; the sixth after some discusslon. It was also agreed, on the motion of Mr Adrian Kidston, seconded by Mr Baird, that the names of the members and associates of the society be appended to the transactions published at the end of the year. Mr Gilbert Macdougal then read a paper on *Some Noxious Insects of the District*, and Mr Croall followed with some remarks on the entomological specimens exhibited. Mrs Hogg exhibited beautiful specimens of rock crystal from the South African diamond fields. Votes of thanks were passed to Mr Macdougal for his paper, to Miss Harvey for preparing the drawings by which it was illustrated, and to Mr Croall for his conduct in the chair. This concluded the business.

NOTES ON SOME INJURIOUS INSECTS.

(By Gilbert M'Dougall.)

The saw-flies (so named by the peculiar formation of their ovipositor, which resembles a saw in miniature, and as such is used by them to pierce the cuticle of the leaf when in the act of depositing their eggs) belong to the order *Hymenoptera*, four-winged insects of which the bee *Apis mellifica* is our best known representative; and it would be well for us if we had no more to be in dread of from the order than by coming into contact with its sting. In an order comprehending such a vast number of different species so destructive to mankind we would least think of looking for some of our best allies. But such is the fact. For in the same order are placed the Ichneumon flies, the females of which are ever on the outlook for pastures new in the form of caterpillars to lay their eggs into, which when hatched feed within the caterpillars and so terminate their existence. My object to-night is not to expound to you how much we are

indebted to these active little creatures (ichneumons) for the amount of destruction they do among noxious insects, but to lay before you some facts relative to two saw-flies members of the family *Tenthredinidæ*, which family contains among its members the most destructive insects the Arboriculturist, Agriculturist, and Horticulturist have to contend with, for neither trees, bushes, gardens, nor fields are exempted from the attack of the caterpillars of these saw-flies. The largest species are to be found upon the Hawthorn (*Cratægus oxycantha*), the Birch (*Betula alba*), and the Willow (*Salix*), while our fir-trees (*Coniferæ*) are divested of their foliage by *Lophyrus rufus*, *L. pallidus* and *L. pini*; our fruit trees, of which more anon, suffer from the attack of several species of *Tenthredo* and a *Lyda*. Gooseberries and currants are often stripped of their leaves before the fruit is half grown, which renders it small, insipid, and unsaleable, by the depredations of *Nematus trimaculatus*, an insect known under several aliases, viz., *Nematus Ribesi*, *N. Grossularia*, *Tenthredo ventricosa*, and *T. Grossularia*. Also, our lovely roses are not allowed to shed their fragrance abroad without furnishing work to the jaws of several species to masticate their beauty out of sight; amongst others, *Hylotoma Rosæ*, and *Athalia Rosæ*—a very near relative unto *Athalia spinarum*, the turnip saw-fly, the caterpillars of which are called by farmers "Niggers," or Black caterpillars. Some seasons these Niggers have been known to devour the whole crop of turnips in a district. It is on record that in 1835, "in Essex, Bucks, Kent, Sussex, Hants, Wilts, Dorset, and Somerset, the turnip was altogether a failure, for the produce of a second and even a third sowing was consumed by them." The *Nematus trimaculatus* appears about the month of April a full-fledged fly. "Its body is yellowish brown; its antennæ nine-jointed and brown; the crown of the head, eyes, the large spots divided by a light line on the back, and a large spot on the breast are all black, the body or belly is orange, the wings reflect the colours of the rainbow, and their nerves, with a large spot on the front edge of the fore wings, are brown, the legs are brown also." Such is the description of a pretty insect, but a most destructive one, as all growers of gooseberries know to their cost. For it is the parent of the green caterpillars so plentiful some seasons upon their bushes. The female when laying her eggs selects the principal nervures on the under side of

the leaf to deposit them upon. But before she drops any she makes an incision in the leaf with her saws, when the two forming a tube conducts the egg to its nest; the fly, at the sametime, injects a fluid, which keeps the eggs moist and secure from several casualities. I have read no account of how the *Nematus* uses her lancets to form the cavity into which she deposits her eggs. I will, therefore, quote Curtis's description of *Athalia Spinarum*:— "She first examines a leaf with the point of her ovipositor, and then fixing herself upon the edge, with her legs equally placed on both sides, holding particularly fast with the hinder, for which purpose the suckers are admirably adapted, she thrusts her saws into the margin, makes a shallow slit, and insinuates the instruments obliquely, sometimes nearly parallel, into the edge of the leaf, backward; having forced them in nearly to the base, she brings them round, forming the segment of a circle, and thus separating the cuticles she forms a cavity with her saws or lancets, which may be readily seen with the aid of a lense, by holding the leaf up to the light. The cutting this cavity often occupies half a minute, when the oval, whitish, and semi-transparent egg passes through the united lancets, which form a tube to conduct it to its nidus; the fly, at the sametime, injects a small portion of fluid, which keeps the eggs moist, and prevents the cuticles from withering and collapsing upon, or exposing it to sudden changes of temperature and other casualties. The four lancets are then leisurely withdrawn and returned to the abdomen until the operation is repeated, and five or six eggs are thus laid in distinct cells, in about twenty minutes." Each fly is said to lay between 200 and 300 eggs. The eggs take about ten days to hatch, and the first appearance of the caterpillars will be evident by the leaves appearing full of small perforations. "These caterpillars are pale green, with one ring at each end yellow; the head, tail, feet, and rows of spots on their sides being black." Several broods are hatched annually between the middle of April and beginning of October, but the May and June broods are the most destructive. The caterpillars when full-fed descend from the bushes and burrow into the earth from one to two inches deep which occupies all their energies for an hour or two according to the moistness of the ground. If the ground is loose and dry, they take a longer time, because the finer particles of earth fall into the hole as they excavate. After they have

arrived at the desired depth, they spin a cocoon of silken thread and gluten quite impervious to wet. When newly spun by its glutinous nature particles of soil adhere firmly to it, so that when turned up it appears like a small lump of earth, and therefore escapes detection. By using any of the means at our command for the extirpation of the early broods, we would have fewer to contend with in September and October, which are the parents of the following spring ones. Sparrows, chaffinches, and greenlinnets when nesting are good scavengers for cleaning the bushes of these vermin, although they will scarcely touch the hairy caterpillars *(Abraxas grossulariata.)* However, the cuckoo is reputed to be very fond of having a dinner off these hairy rascals. The remedies recommended for destroying these caterpillars are legion, as hand picking, dusting the bushes when wet with soot, newly slaked lime, and even salt. None of these are efficacious unless hand picking, and as for salt the cure is as bad if not worse than the evil. The remedy I have found most effectual is to dust the bushes when wet with dew or after a slight shower with white hellebore powder, doing it on the first appearance of the caterpillars, when the succeeding rains will wash the hellebore off the bushes and remove all danger of any evil consequences which might follow after the too soon use of the fruit, if allowed to be of a good size before applying the powder, which is poisonous. I use a Pooley's tobacco distributor for the purpose of distributing the hellebore, and by its use I am enabled to make a small quantity go a long way. My next subject is a saw fly with a peculiar looking grub, which I found last September in two gardens in Gladstone Place upon cherry trees. This part of my paper was intended to have been read at the October meeting, when live specimens would have been submitted for your inspection. Failing these, we do the next best thing by exhibiting diagrams, which faithfully represent the insect in both the grub and perfect state. When feeding or at rest the larva has the appearance of a small black slug stuck upon the leaf, and is therefore called the Pear-tree slug from its partiality to that tree. Although I have read several times about *Tenthredo adumbrata*, I have not met with it before this season. Therefore, little can be said about it from my own observations, farther than the sooner we try to get rid of such a pest the better. The grub, unlike most caterpillars, feeds upon the upper side

of the leaf, destroying the parenchyma, which prevents the elaboration of the sap, and brings growth to a standstill. Curtis, under the head of *Tenthredo adumbrata*, says—"Arboriculturists are familiar with a slimy black larvae like a little leech, which appears as if glued to the leaves of the Pear trees, and which is of very common occurrence in fruit gardens in September and October. From its form and appearance Reaumur called it the slug-worm. At the end of autumn, when it has attained its full size, it somewhat resembles a small tadpole. It has twenty feet, which, however, cannot be seen without dislodging it from the leaf. It does not begin at the edges of the Pear leaf, but gnaws away the parenchyma in the middle, leaving the smalllest veins and the epidermis of the undersides untouched, so that the leaves attacked are left like the finest lace. After four times casting its skin, it changes to an orange yellow colour, comes down from the tree, and forms a cocoon from particles of soil bound together by a few silken threads. The perfect insect, according to Hartig, 'is 2¼ lines long, is smooth, black, and shining, with the horns almost as long as the abdomen ; the legs are black, the joints and thighs reddish brown, the wings obscure.'" Another writer observes—"The grub is frequently very destructive to wall trees. It appears upon pear trees when the fruit are from one-half to two-thirds of their full size, and by destroying the parenchyma of the leaves, it prevents the elaboration of the sap, brings growth to a standstill, and the pears, instead of swelling, drop." Not a very satisfactory way of converting the luscious fruit into £ s. d. There are some authors who consider that the slug-worn of Reaumur produces the *Tenthredo Cerasi* of Linnæus, others again consider it to be the *Tenthredo Æthiopi* of Fabricius. But M. Delacour, Grosky, and Westwood, by their investigations, have set the question at rest, because they found several slug-like grubs which produced insects belonging to distinct species, and that the *Tenthredo Cerasi* of Linnæus forms its cocoon among the leaves of the cherry. For its destruction we have seen quicklime recommended to be dusted upon the trees as soon as the slimy grub is seen, and to be repeated as often as may be necessary. If lime is not convenient to be had, by giving them a squeeze between the finger and thumb will serve the same purpose. But if the fingers are too delicate for such an operation, resource may be had to a pair of old scissors. Generally the food of the

mature insect is pollen grains, whereas some of its cousins, *Tenthredo viridis*, and *Tenthredo scrophulariæ*, are not satisfied with such light fare, but live upon soft-bodied insects, and will even attack the *Telephori* (soft-winged beetles), so that the *larvæ* are phytivorous, whilst the *imagos* are insectivorous. It is recorded of another near relative, *Athalia spinarum* (the Turnip Sawfly), that they are partial to honey, and will sip the sap which oozes from the broken end of a turnip leaf. With the work of the Spruce-gall Aphis, *Chermes Abietis*, I have been for some years familiar, although until this season the insect has escaped any notice. In science the genus *Chermes* occupies a place somewhat intermediate between the scale *coccus* and the green fly *Aphis*, but is quite distinct in its habits from either. Two broods, one in summer and the other in autumn, are hatched annually, and each brood, so far as known, is different in their mode of life. The *larvæ* hatched out in autumn are supposed to be full fed before winter. Whether they form galls or not is uncertain, but it is certain that after pupation they are to be found in spring upon buds of the spruce as wingless females. These are almost a complete oval, flattened and woolly of diversified tints, mostly green or purple. The body is divided into about twelve segments, seven or so of which have got four small spots on each, the legs and antinnæ hairy. These females are very destructive, since each one lays about two hundred eggs; besides, by driving their suckers into the young spruce shoots, they cause an irritation which produces galls. All the galls that I have seen are formed at the base of the current year's growth. Therefore, I am of opinion that these insects, in selecting a spot whereon to deposit their eggs, choose the base of the bud, that when the *larvæ* are hatched the bud has progressed into a shoot, whose bark is tender and easily pierced by the young aphis. How these are enclosed in the galls is a matter of some doubt. Some naturalists hold the opinion that when the galls are gradually increasing in size and the *larvæ* feeding on or around them they are, as it were, engulphed or overlapsed by the excessive morbid growth of the leaves. Miss Ormerod, than whom there is no better authority, explains differently. Her observations lead her to suppose that at a certain stage a crack opens along the galls toward which the tiny insects direct their course and shelter within the galls which closes over them. Whichever of these opinions, if any is

the correct one, I have no opportunity of determining. But this much I will say that by whatever mode the *Chermes larvæ* are entombed in these galls each cell which is formed at the base of a leaf contains a solitary insect. It takes about six weeks to bring these galls to their full size by which time they begin to harden and the *larvæ* enclosed have entered into the pupal state. The *pupæ* are of a dull white and powdery. By the time the *Chermes* have gone into the *imago* state the galls again crack, but this time for the egress of the insect. The mature insects of this brood have got wings. Therefore I would suppose this to be the perfect insect containing both male and female being in that state analogous to the green fly which is viviporous and oviporous. The viviporous fly and the wingless female *Chermes* found in spring are fertile without marriage. The females deposit small parcels of eggs, small in comparison to the females found in spring. The economy of the *larvæ* of this brood is not well known. Here is a field open to aspirants after entomological studies, to trace out the life history of the autumn brood of these insects, specimens of which are to be had upon the Abbey Craig. If any of our members have time at their disposal with which they do not know what to do, by converting that time into researches after this or kindred subjects, they will find that of which they little knew—a wealth of knowledge opened up to them unto their own good and to the credit of our Society.

The monthly meeting of the Stirling Natural History and Archæological Society was held in the Smith Institute on Thursday evening, 1st February — Mr Croall presiding. There was a very sparse attendance of members, which was the more to be regretted, as the proceedings were of a more than usually attractive character. After the usual routine business had been gone through, Mr Croall in a few remarks introduced Dr Galbraith, who had prepared a paper on "Parasitic Fungi on Man." The subject, which is a very wide and most interesting one, received ample justice at the hands of Dr Galbraith. A desultory conversation ensued, which was wound up by the Chairman expressing a hope that some of the other members of the society would follow suit, and work up this or kindred subjects for themselves. On the motion of the Rev. Mr Ormond, a vote of thanks was unanimously

accorded to Dr Galbraith. A magnificent series of rubbings of sculptured stones and crosses found in Islay was exhibited by Miss M'Lagan, Ravenscroft, and a paper prepared by her descriptive of these rubbings was read by Mr David Chrystal. The stones which date from the 11th century are of a very ornate character, indicating a high degree of civilization and knowledge of art. Some of them were covered with soil and grass to the depth of several inches, and no small amount of patience and perseverance was required to disinter them and prepare them for manipulation. Two rubbings of stones from the parish of Govan were also shown. These were interesting as showing the very great falling off in point of taste, and beauty of design from the others found in the Western Islands. Miss MacLagan's experience in the matter, and she is undoubtedly the greatest authority on the subject in Scotland, is that the nearer the stones are found to Iona the more beautiful they are, while the more outlying are very inferior in design and execution. It was moved by Mr Hutchison that the thanks of the meeting should be engrossed in the minutes, and an excerpt should be sent to Miss MacLagan, in acknowledgment of the honour she had done the Society in preparing her paper and exhibiting the rubbings. Mr Robert Kidston exhibited two splendid fossil specimens of Carboniferous Flora of the district, and a specimen of the fungus *Hemileia Vestatrix*, which is making such havoc on the coffee plantations in Ceylon, and which had been procured from the island by Mr Walker, Garfield House, was shown under the microscope. This was all the business.

The following letter of thanks has been sent to Miss MacLagan by the council of the society :—

Stirling Natural History and Archæological Society
(late Stirling Field Club).

Ravenscroft, 13th Feby., 1883.

Miss Maclagan,

MADAME,—I have been instructed to express to you the thanks of the Natural History and Archæological Society for the very interesting exhibition of "Rubbings" and the valuable Notes given at last ordinary meeting. It is, I believe, the only Society that can point to an exhibition of so much value and interest. The members were greatly interested in the subject, and felt much gratified to know that a fellow member had carried out investigations in this particular line of antiquarian research with so much skill and success. I have further to ask that you will be good enough, on some future occasion, to again favour the Society with a view of the "Rubbings," and any additional notes or information which you may deem necessary, we shall very gladly welcome.—I am, yours truly, ALEX. MOYES, Secy.

PARASITIC FUNGI IN MAN.

(By Dr Galbraith).

I have been much gratified by finding my name the first in the syllabus for this year, and by having thus, as it were, to inaugurate the first session of the society under its new appellation of the Stirling Natural History and Archæological Society, a name judiciously adopted as more suitably designating its scope and aims. I earnestly hope that its success may be as satisfactory, and in an even more marked degree, as that which has attended it under its former name of the Stirling Feld Club, and that the proceedings may continue to be as instructive, interesting, and pleasant in every respect as those which have hitherto characterised our meetings here. The members of the society may recollect that last session I read a paper on Parasitic Fungi on Vegetables. I purpose now offering some observations on these organisms as affecting the human body, a subject now engaging, in one branch of it in particular, the earnest attentions of those who devote themselves to physiological and pathological researches. It has long been known to medical men that several of the common skin diseases are due to fungus infection, and further microscopic research is adding to their number. These parasitic fungi belong to the moulds of the *Hyphomycetes*. The most familiar of these fungus affections is the only too well-known ring-worm, in which the diseased condition is due to the growth of a parasitic fungus, termed *Tricophyton tonsurans*, which, although it may attack any part of the integument, especially affects the scalp, where the mycelium burrows deeply among the roots of the hair. Another similar parasite gives rise to what is popularly called scald-head, viz., a fungus termed *Achorion Schönleinii*, and a third, *Microsporon Audoini*, has the effect of totally destroying the hair and leaving patches of permanent baldness. There are other affections of the skin which evidently owe their origin to fungus infection, but these I need not specify. The microscope of course reveals the nature of these skin diseases, but they besides exhibit some characteristics that accord with what is observed in the growth of other fungi, both terrestrial and parasitic. For instance their contagious nature, shown both by the spreading of the affection by new centres of diseased action, and by its communicability by contact to other individuals is easily explicable from what is known

of the dissemination of fungus spores. The contagious nature of ring-worm, and the way in which the fresh spots appear in new places, not always the scalp which may have been its original seat, is a familiar example of this. Lately I was reading of a case of what is popularly known as chin-welk, where this cutaneous disease was apparently communicated to the sufferer through the medium of an infecting razor with which he had been shaved in a barber's shop. Again, the common circular shape which these skin diseases often assume, and particularly in some instances the appearance of a gradually enlarging ring with a centre of skin more or less healthy, analogous to the "fairy ring" in grass, produced as is well-known by small fungi spreading outwards in a circle, and leaving the grass inside of it free through having probably there exhausted the pabulum suited to their growth, is also in accordance with what we know of the vegetative life of fungi. Another similarity seems to me to be deducible from what is often observed of the liability to the frequent recurrence of cutaneous affections in the spring of the year. The disease attaining its height perhaps in summer, then declining under appropriate treatment, and becoming apparently cured, too often re-appears at the season named, as if the hitherto hybernating spores then began to participate in the germinative activity into which the vegetable kingdom is awakened by the vivifying impulse of spring. Lastly; these fungi parasitic on the human body are destroyed more or less readily by chemical agents, such as exterminate their vegetable congeners. Among these are sulphur and its compounds, carbolic acid, iodine, &c. Not so readily, however, in many instances are they thus got rid of, possibly owing partly to the difficulty of bringing the parasiticide into intimate contact with the fungus, both on account of the different nature of the animal tissue in which it has established itself, and of the depth to which it penetrates. Thus cases of ringworm in which the fungus has reached to the roots of the hair are often among the *opprobria medicinæ*. I may mention that the same fungus that produces ringworm affects also some of our domestic animals, as calves and cats, and the disease may by contact with them be communicated to members of the human family. Milkmaids, for example, are said to have had their arms infected by placing them round the necks of calves so infected, and I have been told of school

children in a similar way contracting the disease through caressing a mangy cat, or a calf with a skin disease on the neck. The thrush of infants, well known to mothers, characterised by the appearance of white spots on the lips and over the mouth and throat, is due to a parasitic fungus, supposed by some to be an *Oidium (O. albicans)*, while other observers consider it to be the same fungus that attacks silkworms, *Botrytis bassiana*, belonging to the order *Mucedines* or moulds, which comprises *Oidium* and *Peronospora*. An old application for this disease is borax, a recognised germicide. I have as little doubt that the false membrane which spreads over the throat in the dreaded diphtheria, and is one source of danger, is a fungus. Here, also, the most reliable treatment consists in the use of agents to cleanse the fungus-encumbered membrane. These parasites, harbouring on the surface and in open cavities of the body, have, as has been shown, the characters of other parasitic fungi. Later discoveries with the microscope have led to the knowledge of another class of microcosms living in the fluids and tissues composing its internal structure, which, although they present considerable differences, depending probably upon the different conditions in which they exist, may also be classed among the parasitic fungi. To include them, a new family has been constituted, that of *Schyzomycetes*, so called from their mode of multiplying themselves by division. I draw upon a paper that appeared in the *Lancet*, for an account of the forms that these minute objects assume, a description which will be aided by a diagram of them that I exhibit. 1. *Brownian granules*, minute opaque spherical moving bodies. They exist normally in the fluids of the body, as well as in all decomposing animal fluids. 2. *Vibriones*, chain-like granules, not existing in the normal animal fluids, but always in decomposing animal fluids, in or out of the body, as blood, milk, serum, as well as in abnormal living contagious fluids, as the matter formed in ophthalmia and small-pox. 3. *Micrococci*, spherical pellucid bodies larger than Brownian granules, usually floating free, singly, in groups, or like bead-strings; found in the blood itself in small-pox and putrid fevers, and in the diseased fluids in these and other diseases, and in wounds. 4. *Bacteria*, sausage-shaped bodies, single, or in longer or shorter strings, sometimes jointed; met with in living fluids in pathological conditions, and among all decomposing animal matter. 5. *Spirilli*, long hair-like germs, one 3000th

of a line in diameter, of corkscrew form, like vibriones, generally in active movement. They are found in relapsing fever, and in woolsorter's disease, a very fatal malady, which has recently brought itself to notice among the workmen employed in sorting goat's hair, imported chiefly from the district about Lake Van. 6. *Bacilli*, batons or short rod-like germs, of which there are three distinct pathological varieties, found in malarious fevers, in carbuncle, and in blood poisoning. 7. *Germ-spawn*, fine granular matter, met with wherever mature germs exist, and easily found in decomposing liquids. These organisms, like other parasitic fungi, when they are transferred to a healthy living body, induce in it the same diseased action as in the subject from which they were taken. Although the various kinds of spawn are indistinguishable from each other, injected into healthy animals, they each give results according to their special kind; the virus of small-pox never produces anything but small-pox, nor of scarlatina anything but scarlatina. Their behaviour in this respect, exactly like that of seed sown, shows that in the viruses of epidemic diseases, zymotic, or fermentative, as they are also termed, we have various species of living ferments which play in our bodies a part analogous to that performed by the yeast plant in the brewer's wort. Moreover, these organisms, taken from the body in which they are found, can on outside of it be propagated in some suitable organic fluid—chicken broth is usually employed for this purpose—and after months of successive cultivation, are found still to retain their pathogenic powers, thus further confirming their connection with the cryptogamic division of the vegetable kingdom. It is, of course, well known that in the common epidemic diseases, such as scarlatina, measles, &c., one attack as a rule gives protection against future infection. In this respect there seems to me to be an analogous action to that of the fairy ring fungus already referred to. The micro-organism having exhausted the material suitable for its maintenance, requires fresh woods and pastures new for its propagation. The rule, however, as might almost be expected, does not apply to all diseases presumably of fungal origin. One attack of typhoid fever appears to afford immunity from further infection, but this is not the case with typhus, which possibly is due to a similar exciting cause. There is little doubt that the diseases proved to be produced by these infecting organisms will yet by further investigation be largely increased

in number, and meanwhile reasoning from analogies we may guess at the fungal nature of several. Influenza, and more surely when prevailing in the epidemic form, is probably thus originated. A disease analogous to it, called hay fever, is pretty generally known. It is a catarrhal form of asthma to which certain individuals are constitutionally subject at a certain time of the year, viz., the season when the grasses are in flower. It has been attributed to the inhalation of the minute particles, floating in the air, of the pollen of plants, and particularly of the grasses, which flower in the height of summer, but it is possible that here also some microscopic fungus may be the exciting cause of the distressing symptoms. It is a curious fact that the inhabitants of St Kilda, that Ultima Thule, that far outstanding sentinel of our Scottish shore, that culminating pinnacle of some great subaqueous mountain protruding above the waters of the Atlantic, are liable to suffer from a kind of catarrh called the "Harris Cold," after being brought into contact with visitors from the mainland, if our larger island may be so termed. In this case I imagine the isolated islanders inhale some minute organism from the strangers, who habituated to it, do not themselves suffer any perceptible effects from its presence on their bodies. Perhaps if intercourse with St Kilda should become more frequent, the islanders may in time lose their susceptibility to this curious kind of infection. Boils, a troublesome affection of which some of us have had painful experience, are in general vaguely attributed to "poverty of blood." Besides their being only mild forms of carbuncle, in which *bacilli* are found, I know of no proof of their arising from such a state of the system, and it does not account for a number of cases appearing simultaneously as sometimes occurs, and was the case here about a year ago. I rather look to some microcosmic infection as a more satisfactory and rational explanation of these local inflammatory volcanoes, although, no doubt, a lowered condition may make one a more fit subject for such infection. It is remarkable that when the plague of boils and blains was sent on the Egyptians, Moses and Aaron were directed to take handfuls of ashes of the furnace and sprinkle it towards heaven in the sight of Pharaoh, which was to become small dust in all the land of Egypt, and to be a boil breaking forth with blains upon man and upon beast. This seems very suggestive of minute organisms being inhaled into the system to cause the painful

plague. The discovery of the minute organisms which have been described promises at length to place the theory of the causation of disease on a firmer and more scientific basis than it ever before occupied. In mythological times and for many succeeding ages, epidemics were attributed to the vengeance of offended deities. Thus, in the opening lines of the Iliad, Apollo, incited by the prayer of his priest, who was insulted by Agamemnon refusing the professed ransom for the liberation of his daughter, is represented as engaged for nine days in shooting into the Grecian camp his arrows carrying death, first to the mules and dogs, then to the soldiers of the Greek host. Unenlightened by the lamp of science, men naturally continued to regard epidemics as simply judgments on nations sent from heaven, and they may be so regarded; at the same-time they were the direct results frequently of murderous wars, general absence of cleanly habits, and neglect of the simplest sanitary provisions. The infectious character of many of these epidemic diseases could not fail to be noticed, and then it was natural to suppose that certain unwholesome exhalations were emitted from the infected, as also from clothes and bed coverings which had been in contact with their bodies, and that these inhaled by healthy individuals induced in the latter the same specific diseases. Again, in the case of ague, a prevalent disease at one time in the undrained fenny districts of England, it seemed evident also that a morbific exhalation arose from the water sodden soil, a malaria, a bad air, as it is termed. That the active agent of malaria consists of a low form of vegetable organism may be inferred even from the fact that sulphur seems to exert a marked influence on malarious emanations. In Sicily, although sulphur deposits occur for the most part at various elevations, in some places they are found in malarious plains, and there the labourers in the sulphur works enjoy an almost complete immunity from malarial disease. The marshy plain of Catania, traversed by the Simeto, is infected by fever. On the western border of this plain are sulphur works, at which are a number of inhabitants who suffer little, although a village not far away is deserted on account of the ague. In Ethiopia certain elephant hunters expose their naked bodies daily to a fumigation of sulphur in the belief that this will preserve them from malaria, and they enjoy an almost complete immunity where a whole caravan has been known to perish. Obermeier of Berlin

has actually discovered the connection between this fever and the existence in the blood of a spirillus, which manifests itself during the paroxysm and disappears in the apyretic intervals. Quite recently intermittent fever, or ague, has been treated in India, it is said successfully, by the internal exhibition of small doses of carbolic acid, a well recognised germicide, and no doubt quinine and arsenic, the standard remedies in this disease, owe their potency to their germ destroying properties. As whooping-cough is evidently a zymotic disease, the rationale of an old popular mode of treatment in the chronic stage can be understood, viz., that of causing the patient to inhale the fumes given out by the purifiers in a gaswork. These purifiers are filled with quicklime to extract sulphur from the gas as it passes through them, and the efficacy of the remedy must be supposed to depend upon the sulphurous exhalations acting upon an infecting microcosmic parasite. Lately, in reading through the Odyssey, I was much interested by coming upon a passage that shews the antiquity of the reputation of sulphur as a disinfectant. Ulysses, returned to Ithaca from his twenty years of wandering, having been tossed hither and thither, and the victim of many disasters, has slain the suitors, who during his long absence had been running riot in his house and devouring his substance. The corpses are first carried outside, the floors are swept and the seats and tables cleansed by being sponged with water by Telemachus and his assistants, the cowherd and swineherd. Ulysses then calls to Euryclea, the nurse—and I may perhaps be pardoned if, only for the sake of gratifying my own ears by the tones of the noble, sonorous Greek, I quote the passage in the original—

> Οἶσε θέειον γρηῦ, κακῶν ἄκος, οἶσε δέ, μοι πῦρ
> Ὄφρα θεειώσω μέγαρον'.

"Bring sulphur, old woman, the remedy of evils, and bring me fire, that I may fumigate the dwelling." On which passage Bishop Eustathius, a learned Homeric commentator of the 12th century, writing in the same language, remarks that sulphur used as incense was supposed to cleanse away pollutions. Everyone is familiar with vaccination and its protective power against smallpox, and a similar means of protection against specific diseases, and even of cutting them short, may spring from the knowledge we now possess of their connection with the microcosms we have been considering, and of

the possibility of reducing the virulence [of their action in the system. There are grounds for believing that vaccine matter is the matter of smallpox modified in virulence by having originally passed through the system of the cow. Its mode of action after insertion into the human body, as well as its power of giving immunity from the more grave disease, can be rationally explained only by the germ theory. Before the discovery of vaccination the practice obtained of innoculating with smallpox matter, with the chance of the disease so communicated proving to be of a mild type, and thus giving insusceptibility to infection in the future. Inoculation was practised particularly in Turkey, whence it was introduced into this country by Lady Hester Stanhope, but when Jenner, first by accidental circumstances, then by reasoning and careful investigation and experiment, was led to the discovery of vaccination, inoculation not only gave way to the vastly superior advantages of the latter, but was forbidden by legal enactment as being a means of spreading the disease it was intended to counteract. The germ theory, as it is termed, of disease is gaining wide acceptance among medical men, who in such an uncertain science as that of medicine undoubtedly is, are glad to lay hold on a theory that both from the analogies drawn from the action of parasitic fungi in the vegetable world which it can call to its aid, from the ocular evidences afforded by the microscope, and from the crucial tests to which it has been put, clearly stands on a far surer foundation than any hitherto promulgated to explain the causation of disease. The germs alluded to are of course the spores of the micro-organisms already described as belonging to the vegetable kingdom, and referrible to the division of cryptogams and to the great class of fungi. I may mention that, although many of the *bacilli* are allied to the *algae* in their morphological and vegetative relations, only one alga is as yet known as a producer of disease, a species of *Leptothrix*, which gives rise to concretions in the mouth and salivary glands. *Sarcina*, a curious organism, consisting of minute quadrilateral bodies connected together in patches of four or some multiple of four, which is associated with vomiting in cancer of the stomach, has, owing to its mode of multiplication, been supposed to be an *alga*, but it is equally probably one of the fungi, amongst which the same mode of multiplication is not without example, and at anyrate it may pass through the

system without producing any disturbance direct or indirect. The germ spores, although undoubtedly abounding in the atmosphere, are ordinarily invisible, but are in a manner revealed by a bright ray of light, forming part of the heterogeneous substances that dance as motes in the sunbeam. To their action is attributable the putrefaction of organic fluids, animal and vegetable, which being exposed to the air under favouring conditions soon swarm with minute organisms, as *micrococi*, *bacteria*, and *vibriones*. That the organisms developed in the putrefactive process are not examples of spontaneous generation, as was stoutly maintained by Bastian and others, has been amply established by the experiments of Pasteur and Tyndall, who have proved that animal and vegetable infusions being first sterilised by being highly heated and for a sufficient length of time, and then carefully excluded from the atmosphere, will remain perfectly sweet for indefinite periods. Acting upon this germ theory, and recognising the injurious effects of putrefaction on wounds and raw surfaces of the living body, Professor Lister introduced into the practice of surgery, and has elaborated to its present state of completeness, the antiseptic system, generally known as *Listerism*. This consists mainly in defending all raw surfaces, whether caused by disease, by accident, or by the surgeon's knife, from the morbific action of these atmospheric germs by interposing a protective covering of dressing saturated with some antiseptic substance, notably carbolic acid. Another main feature insisted on by Mr Lister is the performance of operations with the atmosphere surrounding the patient thoroughly charged with carbolic acid, disseminated by a spray producer, while the hands of the operator and his assistants, the instruments used, and everything likely to be brought into contact with the wound are also disinfected, or asepticised by a solution of the same chemical substance. By this method it is claimed that wounds heal far more readily, not being retarded by the formation of purulent matter and putrefactive action, and that the gravest operations, which would scarcely before be attempted, may now be performed with the greatest safety to the patient. Some distinguished operators, however, yet discard Listerism, objecting to the irritating effects of carbolic acid, and, still acting on the same principle, content themselves with defending the raw surfaces from the action of the noxious germs by simpler dressings and the

observance of strict cleanliness. Koch, an industrious enquirer into the history of infecting micro-organisms, has both by the microscope and by the results of inoculating animals with them, demonstrated the connection between blood poisoning from wounds and the presence of these organisms in the tissues and fluids of the body. He was the first who satisfactorily traced their life history in an epizootic disease called splenic fever, which is very destructive among horses, cattle, and sheep, on the Continent of Europe. In Russia, where it is known as Siberian plague, it is specially virulent, man himself frequently falling a victim to it. In the single district of Novgorod, in the course of three years, no fewer than 528 human beings, and 56,000 horses, cows, and sheep, died of splenic fever, while in France, cattle to the value of twenty million francs have perished annually through it. In this fever are found in the blood and tissues accumulations of an organism termed *Bacillus anthracis*. Under the microscope Koch watched its rapid growth by the formation of long slender filaments in which innumerable spores were developed. These spores can be cultivated outside of the body in some suitable fluid, as chicken broth, and develop into the same *bacillus*. By inoculating mice and other animals with *bacilli*, so produced splenic fever was induced in them, thus proving that these organisms are the *contagium*, or virus, or at least the carriers of the contagion of splenic fever. Pasteur, another diligent labourer in this field of enquiry, obtained these germs as virulent as ever from a pit, where cattle that had died of splenic fever had been buried twelve years before. He believes that the seeds of the disease are frequently brought to the surface by the action of earthworms, and that the contagion is thus spread among animals grazing on the infected spots. The protective power of vaccination against the infection of smallpox has been referred to. Naturally the idea has arisen of the possibility of discovering vaccines, if they may be so called, for all infectious diseases, that is, a milder form of the virus of each, to be introduced into the system with a view similarly to afford insusceptibility to future infection. Pasteur has made a step in advance in this direction, having discovered that, by successive cultures of the specific organisms of splenic fever, at last a mildly infecting virus was obtained, capable by inoculation of protecting animals against the severe form of the disease. Of 50

sheep placed at his disposal for experiment he vaccinated 25. A fortnight after the whole 50 were inoculated with a virulent form of splenic virus, with the result that the 25 which had been previously vaccinated with the attenuated form resisted the infection and remained well, while the other 25 all died of splenic fever within fifty hours. The value of this protective process of inoculation having been established by such a decisive test, agriculturists in France so eagerly availed themselves of it that the energies of its discoverer and of his assistants were taxed to the utmost to meet their demands. Six months ago he had thus vaccinated 150,000 head of stock. M. Pasteur has also lately been investigating a disease among pigs, "rouge des porcs," which carried off recently 20,000 animals in one valley of the Rhone. In this case also he discovered the cause to be a very minute organism, in point of size resembling the *bacillus* found in what is known as chicken cholera, but differing in physiological properties, as it has no action on fowls, although fatal to rabbits and pigs, especially to white pigs. Here also Pasteur has convinced himself by experiments that one attack protects against another, and has succeeded, by inoculating pigs with organisms weakened by culture, in rendering them insusceptibile to infection. To return now to these micro-organisms in man, Brantlecht of Brunswich claims to have discovered the specific organism that lies at the root of typhoid fever, a species of *bacillus* flourishing in the water used in the infected district. This *bacillus* seems specially to effect sewage, the dangerous properties of which, when it saturates the soil, and especially when it contaminates the water supply, are now very generally recognised. In the latter case the way in which the disease is generated is easily comprehended, as well as in the well known source of infection through milk contaminated with infective water, but there is also reason to believe that the organisms can be detected in the motes of sewer gases, and the risk of infection from inhaling these may thus be understood. It is very likely that in scarlatina, measles, smallpox, and other such-like infectious diseases, the existence of similar specific organisms will yet be demonstrated. In these diseases, as is well known, infection is readily conveyed through the atmosphere, which indeed might be expected, seeing that in them the skin is so extensively affected. Micro-organisms in all probability develop in the diseased integument and throw off myriads of spores

to be disseminated in the air. In typhoid on the contrary the specific eruption consists of only a few minute spots not always readily detected, and in this disease there is little, if indeed any, danger of infection through coming into contact with a person suffering from it. The infectious matter is in the discharges of the patient, and, these being properly got rid of, there is no risk of attendants on the sick contracting the disease. Hence in one sense typhoid is not infectious. Typhus, again, where there is usually a copious eruption in the skin is eminently infectious. Diphtheria has much in common with typhoid fever, the contagion being transmissible by the atmosphere, in water, or in food, and like typhoid evidently due to an organism that has its habitat in foul water. Affecting the internal throat, a partially closed cavity, it also is not so infectious as some of the other zymotic diseases, but more readily so than typhoid, and we know that the Princess Alice was supposed to have contracted it, and died through kissing one of her children who was suffering from the disease. Evidence has been lately brought forward that leprosy must be included among the diseases which are due to parasitic organisms. A form of *bacillus* apparently specific has been found in various tissues of lepers of different nationalities, and by inoculation of the *bacilli* the disease has been communicated to dogs. Leprosy is well known to be contagious. As to the ancient leprosy of the Jews, which seems to have been a more virulent disease than the forms of it now known, it is remarkable that reference is made in Leviticus to its visibly affecting garments and the walls of houses. This could be attributable only to some fungus infection. Quite recently much interest has been raised by Koch's discovery of the specific organism of consumptive disease, a *bacillus*, which he has succeeded in cultivating by successive generations, through periods of time extending over half a year. At the end of the process the purified *bacilli* were introduced into the circulation of healthy animals, and in every case this was followed by the reproduction of the parasite and the generation of the original disease. It may be asked why these organisms were not long ago discovered by microscopic students. The reason is, the difficulty, owing to their translucency, of detecting them among the tissues and the normal corpuscles existing in the fluids of the body. This difficulty was overcome by Koch, who differentiated them by an ingenious method of staining. He first stained the preparation under

examination of a blue colour, then applied an agent which removed the stain from the tissues, turning them brown, but left the *bacilli* still tinted blue, and in this way distinguishable in the microscopic field. Of the minuteness of the *bacillus* of consumption, an idea may be formed when I mention that in length it is equal to half the diameter of a blood corpuscle, and in breadth to one sixth. Consumption being notably a hereditary disease, if Koch's *bacillus* be really its exciting cause, it must be supposed, in order to account for the heredity, that spores may be transmitted from the mother, and remain dormant in the progeny until circumstances arise to favour their development. Here crops up again the influence sulphur exerts over these morbific parasites. Herr Kircher, a pupil of Liebig, who has been forty-four years director of an ultramarine factory, in which a special process of manufacture is employed, involving the formation of sulphurous acid by the burning of sulphur, asserts that his workpeople enjoy a perfect immunity from consumption, typhus, cholera, &c., and recommends the treatment of consumptive patients by exposing them to the fumes of the acid in a closed apartment. By this treatment he maintains that within twelve days *bacteria* gradually disappear from the expectoration. I feel that I have now but inadequately, and in a somewhat disconnected manner, described the action of parasitic fungi, its extent and variety. Still, however imperfectly sketched, I believe that the facts adduced, will carry sufficient weight to convince even those who have never turned their attention to these apparently insignificent, but really most potent vegetable organisms, that it would be difficult to over rate the importance of their influence in the economy of this world—an influence exerted over the members of both the vegetable and animal kingdoms. Nor in the case of man is it only his health and physical well-being that are thus affected by their direct and patent action. His social circumstances are also influenced and modified, often to an extent which does at first sight seem almost incredible. The effect of an *oidium*—itself after all only a rudimentary form of a more perfect fungus, in totally altering for a time the industrial occupations of a people, as in the instance of the inhabitants of Madeira noticed in a former paper, can easily be understood, and other similar possible contingencies will readily suggest themselves. But a statement that can be asserted with the same confidence may be received with

more surprise, viz., that the abolition of the corn laws was ultimately and directly due to the action of a parasitic and microscopic fungus. Yet the statement only asserts an indisputable fact. The Anti-Corn Law Leaguers had for some time been battering the stronghold of protection with its skilfully constructed outwork of the sliding scale, behind which the landlords and agriculturists were apparently securely intrenched, and likely to withstand the attack for an indefinite period. The plague of *peronospora infestans* suddenly broke out in Ireland, and totally destroyed the chief crop of the country. To mitigate the consequent famine that devastated the wretched population, the minister of the day felt himself compelled all at once to yield to the demands of the leaguers, and the prohibitory Corn Laws were forthwith swept away. The suddenness of the event reminds one of the overthrow of the walls of Jericho at the blast of the trumpets. It will readily occur to those who have taken the trouble to listen to the reading of this and a former paper, that the potency of the minute organisms of which they treat is mainly due to their remarkable powers of multiplication and dissemination, of which notice has been taken. The magnitude and extent of the results flowing from the action of agents apparently so insignificant in themselves is entirely in accordance with the operations of nature's laws in the physical world, according to the opinions now most generally accepted. The theory of the moulding of the surface of the globe to its present condition is no longer attributed solely to violent cataclysms alternating with prolonged intervals of quiescence, but rather to the slow persistent action, through unknown periods of time, of forces still constantly at work. And in the social relations and conditions of nations the same general law obtains, that great changes are not brought about so much by great catastrophes, by devastating wars, by the earthquake and the volcano, by the hurricane and the flood, but rather by the silent working of innumerable minute agencies which by their multitude and simultaneous action accomplish in the end mighty results. The Almighty disposer of events manifested Himself to the prophet, not in the strong wind that rent the mountains and brake in pieces the rocks, not in the earthquake, not in the fire, but by the still small voice.

RUBBINGS FROM THE SCULPTURED STONES OF ISLAY.

(By Miss MacLagan.)

In submitting to inspection these rubbings from tomb-stones and crosses in the Island of Islay, it appears to be necessary to append to them a few notes explanatory of their surroundings and the circumstances in which they now exist. The Island of Islay is one of the largest and has been termed the fairest of the Hebrides. Tradition tells us that it was there that Columba planted the first of the churches outside of his own Iona; and even now we can, on consideration, understand the likelihood of this circumstance, as the island has capabilities of maintaining a population more abundant than most of the others around. The whole southern portion of it is non-mountainous and largely fitted for cultivation, and though at this date much of it is under peatmoss, it is not necessary to believe that it was so in the same degree in days long past; for in that moist climate peat is of rapid formation, and it may well be supposed that when the population was greater, so also was the cultivation, and it is asserted that the number of inhabitants of this island is now only half of what it was in even comparatively recent times. No doubt Columba built churches where he knew there were people to use them. Islay is broken up all along its seaboard by many far injecting lochs, and as the sea was in those days the great highway of nations, this was of the greatest importance in endeavouring to plant churches; and certain it is that it is on these sea shores that almost all the ancient ones are found. Of these, Kildalton and Neribus are said to have been the first; and there it is that we find the greatest number of sculptured stones and crosses of any churchyard in the island.

KILDALTON RUBBINGS.

The parish of Kildalton is 15 miles in length by 5 in breadth, and has in it less of cultivated land than the western portion of the island. The ancient Parish Church, with which we have now to do, stands on a headland called Ardmore, at the entrance of Islay Sound—a lone, desolate place, with scarcely a house to be seen all around. This church has been a roofless ruin for well nigh 200 years; yet its walls are still good and might support a roof. The style of its architecture bespeaks for it a considerable antiquity (it is supposed to be of the 13th century); and though most simple in its form, the

mould of its windows shews tasteful lines such as are not found in churches of more recent date. We turn to the sculptured stones and crosses within and around it; none of them bear dates, and only on one is there any inscription—that of the tombstone of the two warriors (No. 1), and it is sorely obliterated. The galley depicted on the stone seems to indicate these two gentlemen to have been Campbells. This want of name or date is quite a mark of antiquity. Another mark is extreme narrowness. The rubbings given are eight in number. Near to the church is a grand cross of most elaborate sculpturing, innumerable are the serpents and twisted work on its one side; and on the other are depicted several sacred persons and scenes. The whole is in alto so high that rubbings could not be executed; but our party so washed and brushed the whole cross that an excellent photograph has since been done from it, which before was impossible, as it was hoary with lichens. A model has also been done of it for the Edinburgh Antiquarian Museum. When, in 1881, we saw this churchyard, it was a mass of the rankest vegetation, and its beautiful stones all unheeded; but attention being called to them by our rubbings, the parishioners have subscribed the sum of £40 towards putting the ground in better order, and already the great cross which was hanging to a side in a dangerous manner is again set up right, and other good deeds are intended to follow. At a short distance from the church is a very beautiful cross in high preservation, but of much smaller dimensions.

TEXA.

This is a small island, part of the parish, about a mile off its shore. It is more than one mile in length, and half a mile in breadth, treeless, rocky land. On it is a ruined chapel, and also remains of a Monastic house. There formerly stood near the chapel a cross and a few sculptured stones, all of the rudest type as our rubbings show. These have, however, been removed from the island to the private grounds of Mr Ramsay, of Kildalton. One could have wished them still to have been on the lone island—inaccessible though it be.

KILNAUCHTAN.

In the same parish, and distant from Port Ellen about 2 miles, there is yet another ancient churchyard, with the remains of the old Parish Church, which was used for worship after the still older one

at Kildalton had been deserted. Around this ruin is a rather large graveyard, much used in modern times by the parishioners, and sometimes those so distant as Kintyre. Within the old church are the stones from which the two rubbings of our collection were done. In 1881 we had seen them and marked their antiquity and artistic merit, but had then no means of doing rubbings. Returning in 1882, with the intention of making them, we were amazed that the stones were no longer to be found. On enquiring of the good woman in charge of the churchyard key, who fortunately lived close by, she affirmed they had not been removed though now invisible; further search was made, and there, beneath from 6 to 12 inches of soil, carefully spread and sown with grass seed, lay the missing stones. It will be easy to understand that the toil of removing this was not small, before these rubbings could be done, but they are worth the pains. One is the tombstone of a lady, the other of a knight. This incident is mentioned to show the tone of feeling which prevails in the island in regard to its ancient monuments. The churchyard is situated on a lone bay, whose drifting sands were in danger of completely covering it up. A high wall now surrounds it, thus steming the flow of sand, and a race of smart modern gravestones is rising within its shelter.

KILARØW.

This very ancient churchyard is in nearly the centre of the island, and yet, strange to say, is also on the seashore, so far does Lochindale penetrate inland. The coast here is singularly level, and is bright with a long stretch of beautiful sand beach, said to be an unbroken line of 7 miles in extent, and of great breadth, as the tide recedes almost a mile. Nestling among the trees which surround Islay House (and to be among *trees* is a rare thing in Islay), is the very ancient churchyard of the parish, though the church is now removed to Bowmore. Besides the singularity of tree shelter, there ought to be mentioned one as peculiar to it, which is that it is kept in good order, simple and green. Within its walls are the finely sculptured tombstones of bishops, warriors, and religious ladies—the communion cup, the sword, and the shears. In most instances, the warriors are cut in so high relief as to make it impossible to take rubbings from them, and time did not permit of drawings, but omitting these, there still remained the finely cut stones from which the accompanying rubbings were executed.

NERIBUS.

This is a desolate, unsheltered, uncared for place, where there formerly stood a church, of which only a few stones remain. Around it are many tombstones and fragments of crosses. One whose shaft alone remains, is that of a bishop, and probably the place had been of some ecclesiastical importance, for at little more than a stone's throw distance is another churchyard, where there are a greater number and finer portion of this collection of rubbings. Of these we have done 10. Neither of these churchyards are enclosed, but left to deep neglect, where every weed has its most luxuriant growth, so that it needed "spade and mattock" before a sight of these stones could be obtained.

KILCHOMAN.

At Kilchoman the churchyard surrounds the modern Parish Church, and is situated on rising ground commanding a noble view of the Atlantic Ocean. Here we did only three rubbings from tombstones, but several from crosses, which are more abundant here than are the former, some of these unfortunately represented to us by only fragments found here and there deeply imbedded among the weeds; the several pieces of one we adjusted to each other, as is shown in the rubbing on which both sides are shown. It is handsomely sculptured on both sides, and has an inscription all around its narrow rim, but this is sadly obliterated. The shaft of a cross belonging to a bishop is another of these rubbings, and is of very graceful design. The rest are mere fragments, save the great and very entire cross, which is finely carved on both sides. But we are able only to show one side. Our stock of paper being exhausted, through the kindness of Mr M'Call, the minister, we have the promise of receiving a rubbing from the obverse when weather permits. This gentleman kindly rendered every needed assistance in our work. A large flat and square stone furnishes a socket in which the shaft of this cross is sunk, and at each of the four corners there is cut a circular hole about 12 inches in diameter. These holes had been furnished with semi-wedge like stones, formed to play in them, only one of these remains entire, another is broken. The local tradition says that to turn these stones round in their several holes was a penance done at the foot of the cross, but this is mere conjecture. At a distance of about 300 yards from the church there are four rude crosses standing

marking off a square, within whose limits was sanctuary. All these features of the ecclesiastical furnishing of this parish shew it to have been a place of importance in the olden times.

KILNEAVE.

In the same parish is the very ancient church of Kilneave. Its walls are still in a sound state, owing perhaps to the fact that they are 3 feet in thickness. Under the east window there still remains in a shattered state the stone altar. The whole is an interesting structure of probably the 12th century, but of it we shall not now write. There are no carved tombstones around it. The cross is of the most ancient type, its sculpturings are much effaced, and one of its limbs split and the sculptured side of it lost. This church is also situated near the sea, on the shore of Loch Grunnart.

CIL-A-MEANEACH, OR KILMANY.

This is the one inland churchyard of the island. The name, it is said, signifies the middle. The place has no beauty belonging to it. Within the churchyard there are only three sculptured stones, whose rubbings are among this collection. It perhaps is right to mention, to the credit of the parishioners, that they have at some cost enclosed it with a substantial wall, and have taken care to announce the fact by a tablet affixed to the gateway.

FINLAGGAN.

Is in the neighbourhood of Port Askaig. The archæological remains here are situated on an island in a small lake. They are—the Castle of the Lord of the Isles, together with the remains of a church, probably of the same date as the Castle. Before coming to the place, we were told that the island could not be approached without the use of a boat, and that there was none on the lake. Notwithstanding these very discouraging affirmations, we resolved to go on and see what could be done. Arrived at the lake, we found that its shores were very level, and that the said interesting ruins stood on ground naturally peninsular, but which had been made insular by a broad moat cut across the neck of sand. This moat, by the help of a July sun, had become a marsh over which our polite and clever young guide laid planks. One after another lifting the one we had passed along, laying it in front, repeating this process until we were safely over. Certainly not with *dry* feet. The re-

mains of the Castle do not bespeak its having been a place of great strength, and the surrounding waters must have constituted its main defence. The scattered fragments indicate that it had been of considerable size, and we know it had been of importance, for here it was that the Lords of the Isles in succession were wont with solemn rites to be sworn to the headship and defence of the Clan Mac-Donald. The small church, whose ruins are alongside those of the Castle, is of the simplest architecture, and there remains only three noteworthy tombstones—none of them of fine workmanship. One is so small as touchingly to hint that the boy son of a chief may have been laid beneath it.

In conclusion, we may now make some general remarks on the collection now before you. One is that in each of these parishes there are such different styles of art as to shew that these sculpturings were not the workmanship of one age, and indeed there is in a manner brought out among them a history of a rise and decay of art. And let it always be remembered that such as they are, Scotland may well be proud of having them, as no nation of Europe in the same era has any monumental stones at all to be compared with them. Besides these tombstones of the fathers of Islay, there are several other antiquities well worth noticing, but these perhaps are not of a kind to interest our Club, whose archæological standing is rather youthful; but in the matter of these rubbings we are in advance of the Edinburgh Antiquarian Society, as they—strange to say—have no knowledge of the Sculptured Stones of Islay.

The usual monthly meeting of the Stirling Natural History and Archæological Society was held in the Smith Institute on Thursday evening, 1st March—Mr Croall presiding. There was a large attendance of members. After minutes of former meeting had been read by the Secretary and approved of, Mr Croall, in appropriate terms, introduced the Rev. Mr Paul, Dollar, who read a paper on "Shell Middens and other interesting remains found at Tent's Moor, Fife." Mr Paul also exhibited flint arrow heads and other weapons, old coins, pins, whorls, and other articles of an archæological nature, which he had found in the course of his explorations. An interesting letter from the famous Alexander Henderson, minister of Leuchars, with the date 1613, to the Countess of Mar at Stirling

Castle, and a communion token with Henderson's monogram were also shown. In the discussion which followed on Mr Paul's paper, Miss Maclagan suggested that the midden heaps might be laid to the account of the fishermen as at Buckhaven, where large quantities of clam shells, which had been used as bait, might be found. In connection with Alexander Henderson's letter, Mr Cook stated that three times he had been called to Stirling while at Leuchars, but he stedfastly resisted all attempts to transfer him hither. Mr David Chrystal corroborated Mr Cook's statement from old ecclesiastical documents in his possession. A hearty vote of thanks was, on the motion of the Rev. Mr Goldie, passed to Mr Paul for his very interesting paper, and a similar vote to the Chairman concluded the proceedings.

SHELL MIDDENS AND OTHER INTERESTING REMAINS AT TENTS MOOR, FIFE.

(By Rev. Robert Paul, F.S.A., Scot., Dollar.)

After some general introductory remarks on the subject of primitive man, and on the two great geological epochs, the *palæolithic*, and the *recent*, the latter divided into the neolithic, bronze, and iron ages, in which are to be found the remains of early man, Mr Paul proceeded to describe the part of Fife to which his paper related. Tents Moor is the district in the north-eastern corner of the county of Fife, lying between the estuary of the river Tay on the north, and the river Eden on the south. If we take the railway (N.B.) as its boundary on the west, and the sea on the east, it is about six miles long and three broad. It belongs chiefly to the parish of Leuchars, though a small portion lies in that of Ferry-Port-on-Craig. The entire district consists of sandy bent or downs, covered with coarse grass and whins, and here and there a little heather. It owes its formation in all probability to the deposits laid down by the rivers Tay and Eden, and was apparently at one period quite under water, as shells and waterworn and rounded stones and pebbles are everywhere to be found over its surface. At no very distant period it seems to have been somewhat thickly inhabited by a large number of small crofters, but it is now divided into several extensive farms. The greater portion of it, however, is incapable of cultivation, though patches of arable land are here and there to be seen, in consequence of the sandy and shifting character of the

soil. The strong winds from the German Ocean, which in spring and autumn sweep with great force over its flat surface, make almost every year an appreciable difference in its conformation. The land is therefore mostly used for the rearing of sheep and as rabbit warrens. All over this tract of country traces of various kinds are to be found of the inhabitants who occupied it at different periods. Among the most interesting of these are the "shell middens," large mounds or accumulations of the remains of edible shellfish, which were used for food by the primitive people of our country in prehistoric times. It is only in comparatively recent years that due attention has been paid by archæologists to these remains of the prehistoric inhabitants of Scotland. In Denmark, however, where similar mounds are to be found on the seaboard in great abundance, they have long been regarded with interest, and been studied with much painstaking care. There they are from 3 to 10 feet high, and in area are some of them no less than 1000 feet long, and from 150 to 200 feet wide. They are rarely more than about 10 feet above the level of the sea, and are composed entirely of myriads of castaway shells of the oyster, cockle, mussel, limpet, and periwinkle, plentifully mixed up with the bones of various quadrupeds and fish. To these mounds in Denmark the name of "Kjökken Mödding" is applied, the exact equivalent of which in our own language is "Kitchen Midden," on the whole a very suitable and appropriate designation, exactly describing what they are. "Everyone who is acquainted with the country districts of these civilized British Isles, has seen a midden on a small scale outside many a cottage door. That heap of cinders and rubbish, if carefully sifted and examined, would reveal with tolerable certainty the villager's condition in life. We should learn from the fragments of bone, and from the shells of whelks and periwinkles, what he ate; and scraps of broken crockery, a rusty knife-blade, and such trifles, would let us into the secret of the *ménage*. The midden-making habit will indeed never be eradicated. It survives everywhere in the form of the dust-bin, the highest civilised expression of an ancient institution; and it would surely re-appear in its pristine nastiness before the door of every house in the alleys of our great cities, if their inhabitants were left to their own devices. Thanks, however, to the uncleanly practice we learn from these great middens, com-

posed of mussel, oyster shells, &c., with here and there a scrap of rough pottery, and a more or less polished stone implement, that large village communities established themselves on the shores of the Baltic Sea, and probably dwelt in mud huts." *(Chambers's Journal, January 14th, 1882.)* Amongst those who first discovered these shell middens on our own coast was the Rev. Dr Gordon of Birnie, who, about 20 or 25 years ago, drew the attention of archæologists to a number of specimens in different parts of Morayshire, especially adjoining the village of Burghead and along the margin of the Loch of Spynie, at which latter place the largest of our Scottish kitchen middens is to be seen. Since then similar pre-historic remains have been discovered elsewhere in Scotland, but principally on our eastern sea-board. Strange to say, the same is the case in Denmark, where these mounds are not to be found on the parts of the coast bordering on the Western Ocean, though this may partly be owing to the fact that here the land is rapidly being eaten away by the force of the waves. The gradual encroachment of the sea may have removed part of the coast on which similar remains were also once to be seen. Mr Paul explained that having occasion to visit this part of Fife frequently, his attention had been called to the interesting pre-historic remains on Tents Moor, and that during the last two years he had paid it several visits, both alone and in company with others who knew the district well, making minute examination of the whole, and gaining much information about the place from local and other parties. Traces of shell middens are found in different parts of Tents Moor, the contents of some of them being much scattered, and some occurring alone and not in groups, especially in the portion which is included in the parish of Ferry-Port-on-Craig. A large group, however, is situated towards the southern end at the distance of about half a mile, nearly due west, from the mouth of the Eden. This group consists of some eleven or twelve distinct mounds, running N.E. and S.W. These vary considerably in height, size, and shape. Mr Paul made careful measurements of some of the largest. The largest of all is about 9½ feet high. The next in size is about 9 feet high and 66 yards in circumferenee, while other two were found to be 8 and 5 feet in height respectively. Like the Danish "Kjökken Möddings," those on Tents Moor are all about 10 feet above the sea level and about half a mile from high water mark. It is possible, however, that at

the period of their formation they were considerably nearer to the sea, since the rivers Tay and Eden are unquestionably constantly depositing large quantities of sand and mud along the coast—a process which is clearly seen at the mouth of the Tay, where what are well known as the "Abertay Sands"—so fatal to vessels in stormy weather—are being rapidly increased in size, and bid fair by and bye to enlarge very materially the solum of this tract of country. By aid of a carefully prepared map, enlarged from that of the Government Ordnance Survey, Mr Paul pointed out the various points of interest to which he had referred, and mentioned in connection with the deposits of sand by the Tay, that a retired naval officer, long resident in the locality, had told him that almost every year the "fair way" of the river was shifting farther to the N. and E., in consequence of the growing accumulations in the neighbourhood of the Abertay Sands. The shells of which the Tents Moor mounds are composed (of which various specimens were exhibited) consist exclusively of four species, viz.:—The cockle *(Cardium edule, L.)*, the mussel *(Mytilus edulis, L.)*, the periwinkle *(Littorina littorea, L.)*, and the common whelk *(Buccinum undatum)*. With the exception of the last, these species are amongst those which are most abundant in the Danish Kjökken Möddings. The cockle and mussel shells largely predominate in the mounds towards the south, near the mouth of the Eden, while in those towards the north, nearer the estuary of the Tay, the cockle is not to be found at all—the whelk, however, being much more abundant in the latter than in the former. It is an interesting fact that at the present day the cockle lives and thrives in the sea at the mouth of the Eden, while it is practically unknown on the coast of Tents Moor, bordering on the estuary of the Tay, showing that the habitat of these species of shell fish has not changed even after the lapse of centuries, since these shell middens were first formed. Unlike those in Denmark, and those also discovered in Morayshire, these accumulations of shells did not yield, on examination, any flint implements, or fragments of pottery. In a very few cases, fragments of bone, however, split open longitudinally, as if to extract the marrow, were found, a specimen of which was exhibited. Flint arrow-heads in abundance have been found in their immediate neighbourhood, but none in the mounds themselves. In the Danish middens, bones of various quadrupeds, birds, and

fish are plentifully mixed up with the shells of the molluscs, and have almost all been identified by competent naturalists. Now, these shell middens were probably formed by companies of our prehistoric ancestors, the aboriginal inhabitants of Scotland during the stone age, and if we accept the opinion of Sir John Lubbock in the case of the Danish mounds, during that part of the stone age called the "Neolithic," when the art of polishing flint implements was known indeed but not far advanced. During the winter months of the year they would retire to the woods and fastnesses in the inland parts of the country, where they would find abundance of food and shelter, while in summer they would settle on the sea coast, subsisting chiefly on the smaller animals, on fish, and on the molluscs, the shells of which still remain in these immense mounds to testify to their abundance. This is precisely the custom which prevails among some of the Indian tribes in California at the present day, where it has probably been in use from early times. Sir Charles Lyell in his "Antiquity of Man," mentions having observed similar large heaps of oyster and other marine shells mixed with bones and stone implements both in Massachusetts and Georgia, U.S., covering in the latter State 10 acres of ground to an average height of five feet. Next to these kitchen middens, the most interesting remains on Tents Moor are the flint implements, which are to be found in considerable quantities over almost its entire area. Various specimens of these found by Mr Paul himself or by his friends, were exhibited to the meeting. They are, for the most part, small in size, having been used by the aborigines as arrows, small knives, borers, scrapers, &c. Some of them are very small, and very sharp, but bearing unmistakable evidence of having been shaped by the hand of man. The fact that few, if any, large stone weapons, such as axes or celts, have been discovered in this tract, seems to support the hypothesis already mentioned regarding the summer occupation of the original inhabitants. There being then no woods on such a flat and sandy plain, and so near the sea, the larger description of animals hunted by the natives for food, or from which they needed to defend themselves, would probably be absent, and consequently only such weapons and instruments as were needful for the killing of smaller animals and for domestic purposes, would be required. The process by which these flint implements were probably made, was explained by

Mr Paul, and one of the rounded stones, with worn ends, exhibited, supposed by competent authorities to have been used in their manufacture. By means of some beautifully executed drawings of flint instrument found by himself on Tents Moor, he illustrated some of the special features which characterise them, *e.g.*, the ripple-flaking, the supposed method of hafting or fastening the flints to handles, &c. The manufacture of these implements may be said to be one of the lost arts, the production now-a-days of ripple-flaking, *i.e.*, of the fine wavy lines on the flints, being pronounced by all who had given attention to the subject as simply impossible. Almost the only person who had been even moderately successful in imitating the handiwork of the people of the stone age was an impostor who received the soubriquet of "Flint Jack." This man, who died a few years ago, perambulated Yorkshire and some of the Midland Counties of England, carrying on for some time a "roaring trade" by selling arrow heads of flint, and other similar implements to the unwary as genuine antiquities, whereas they had been manufactured by himself, often in a few minutes, with marvellous precision and skill. Some specimens of "Flint Jack's" handiwork, from the Society's own museum, were produced by way of illustration. The flint from which these various implements were struck is not indigenous to Scotland, and it is believed that it formed an object of barter between the different peoples in these far off early days, being brought from England and the Continent. Not far from the spot where the largest group of shell middens is to be found on Tents Moor, there seems to have been a regular manufactory of arrow heads, judging from the number which have been found there, from the nodules of rough flint, and innumerable flakes or splinters which have been struck off them in the process of manufacture, which everywhere abound. Coming down to more recent times, reference was made by Mr Paul to the subsequent population occupying Tents Moor. That this tract was at one time much more thickly peopled than now, is plain from the many coins which have been picked up. These coins, of which a number were exhibited, range from some of the smaller pieces connected with the Roman occupation of Britain, down to the coins (the smaller ones, most commonly) of our later English and Scotch kings and queens. Large quantities of fragments of coarse

pottery are turned up over the whole district whenever the soil is disturbed. Remains of cinerary urns have also been met with, and on the site of several of the old hamlets particles of broken iron, bronze pins, old pipe heads, &c., are continually being picked up. In the 17th and 18th centuries the inhabitants of Tents Moor did not bear a very good character, many of them being notorious smugglers and wreckers, of whom many strange and amusing stories and traditions still linger in the locality. They were alleged to have been descended from some Danes who were shipwrecked upon this part of the coast, but no reliable authority can be found to substantiate this statement. The celebrated Alexander Henderson was minister of the parish of Leuchars for 24 years, from 1614 to 1638. One of the kirk tokens of Leuchars parish used during his incumbency was shewn by Mr Paul. It was found among the foundations of some old houses near one of the Tents Moor farms. On one side it has the letter "L.," and on the other, the letters "A.H.," in a simple monogram. In one of Henderson's sermons, which has been preserved, and which was preached in the church at Leuchars, on the 15th of July, 1638, he rebuked his parishioners for working on the Sabbath during his absence on national ecclesiastical business, "whilk ye were not wont to do," he says, as also with running "from the one end of the parochin to the other to see a dancing," on the same sacred day. About this, the editor of Henderson's sermons says, in a footnote, "It is probable that the dancing took place near the coast, among the sea-faring part of the population." *(Sermons, Prayers, and Pulpit Addresses, by Alexander Henderson, 1638. Edinburgh, 1867, p. 363.)* Clearly the dwellers on the Tents Moor in Henderson's day, were not Sabbatarians, nor from what we know of them, would we expect them to be such. At this period a considerable portion of this district belonged to the laird of Scotscraig, in the parish of Ferry-Port-on-Craig, whose name was Arthur Erskine, and who was the sixth son of John, Earl of Mar, High Treasurer of Scotland. Erskine married Margaret, the only child of Sir John Buchanan of Scotscraig, by whom he came into possession of the property. Tents Moor, however, was not an original part of the barony of Scotscraig, but was bought by Arthur Erskine from the Earl of Kinghorn, his brother-in-law. By a deed executed in 1651, he settled Tents Moor upon his two younger children, William and Charles Erskine. In this

deed reference is made to the large population dwelling on the land, and Erskine's sons are authorised to "intermeat and uptak the hell rents, kens, casuallitis, from the tenants and possessors therof," as also, to "creat balzies and others members of Courts needfull, in as ampill form and pour as I my selfe might or was in use to doe befor,"—terms which plainly imply the presence of a very considerable population. Arthur Erskine was a prominent leader among the laymen of the Covenant, and figures frequently in the history of those times. His family seems afterwards to have fallen into poverty and his estate of Scotscraig became subsequently the property of the notorious Archbishop Sharpe. A portion of Tents Moor is still included in the property of Scotscraig.

The monthly meeting of the Stirling Natural History and Archæological Society was held in the Smith Institute on Thursday evening, the 5th April, Mr Croall in the chair. There was a fair attendance both of ladies and gentlemen. Mr David Chrystal, who had been appointed Secretary, in room of Mr Moyes, resigned, was introduced and read the minutes of the March meeting. The names of Mrs and Miss Oliphant, Allan Park, and of Mr John Meiklejohn, Melville Terrace, were submitted to the meeting with a view to membership. On the suggestion of Mr Cook it was resolved to send a deputation from the Society to Tents Moor in Fife to make investigations into the archæological remains to be found in that district. Thereafter Mr Croall in appropriate terms introduced Mr Cook, who read an interesting and exhaustive paper, embodying the result of his researches into the origin and history of "The Guildry Ring." A desultory conversation followed on several points touched upon in the course of the paper. A cordial vote of thanks was, on the motion of Dean of Guild Shearer, passed to Mr Cook. This was all the business. The chain of office, medal, and ring of the Stirling Guildry were, through the kindness of Mr Thomas Low, Dean of the Guildry, laid on the table for inspection, as well as a case of interesting exhibits from Tents Moor sent by Mr Joseph Napier.

THE STIRLING GUILDRY RING.

(By Mr W. B. Cook.)

Mr President, Ladies, and Gentlemen—I am well aware that any interest the following observations

may possess arises from the fact that they relate to a subject which may be called purely local. It is to our own ancient burgh I wish to direct your attention—to Stirling, whose very name awakens in our minds thoughts and associations which, forming as they do an important part of our existence, naturally incline our ears to any information that can be gathered as to the history and antiquities of the "City of the Rock." At the same time, however, I am not without hope that the results of my investigations into the origin of the Guildry Ring may also be found to be not entirely destitute of archæological value, such as will give this paper a claim to come under that part of our Society's new and enlarged title, which describes a section of its work having for me a very great attraction. No mention is made of the Stirling Guildry Ring in either of the Statistical Accounts of the parish, or in any of the histories of the burgh or county. It is just such a relic as would have received loving attention from the Rev. Mr Macgregor, Stirling, who edited the second edition of Nimmo's "History of Stirlingshire," but he appears never to have heard of it. Nimmo's silence sufficiently accounts for the absence of any reference to the Ring in what is called "Randall's History of Stirling," for notwithstanding the pretensions of the Preface to that work, it is neither more nor less than a barefaced piracy from the first edition of the county history —a transgression which is all the more inexcusable because Randall does not once allude, so far as I remember, to the author whose pages he so coolly pillaged. The earliest printed notice of the Ring I have been able to find occurs in Robert Chambers's "Picture of Stirling," published in 1830. At page 9 of that interesting work, Mr Chambers says: "The Dean-of-Guild, when installed into office in the guild-hall, has a ribbon thrown round his neck, at which is suspended a very ancient gold ring set in precious stones, with the inscription, 'Yis for ye Deine of ye Geild of Stirling.'" This rather vague description of the Ring has been copied into some of the small histories and guide books with which we are familiar. The next notice of the Ring, in order of date, is to be found in a volume entitled "National Record of the Visit of Queen Victoria to Scotland in September, 1842." In that year Her Majesty came for the first time to the land which was afterwards to become so dear to her, and the warmth of her reception on that occasion may have had something to do with the

favourable impression of Scotland and the Scottish people which she carried away with her, and which was the determining cause of the royal establishment at Balmoral. Stirling, like its neighbours, made a supreme effort to demonstrate its loyalty in a way which would please the young Queen and the Prince Consort, and the result was a success which must have gratified Provost Galbraith, father of an esteemed member of this Society, Dr Galbraith, and the other gentlemen who exerted themselves in the matter. Mr Jas. Buist, the compiler of the volume referred to, in narrating the proceedings at Stirling, says—(p. 207)—"At and within the arch [this was a triumphal arch erected at the Bridge] were stationed the Guildry, with the Dean [John Sawers, afterwards Provost] at their head, and Jas. Lucas, Esq., bearing the standard of this very ancient and respectable body. . . . . The Dean wore the gold chain and medal belonging to his office, and a very old ring, set with precious stones, probably given to be worn by that functionary by the monarch who constituted them as a corporate body."(1) Only one other allusion to the Guildry Ring need be noted here. Mr James Shirra, who has a good deal of information about Stirling in the olden time, states in his pamphlet on Cowane's Hospital, published in 1868, that "this ring has been strongly conjectured to have been a present from John Cowane, for the honoured confidence reposed in him by the Incorporation of Merchants." The conjecture here mentioned is quite a natural one, for, whether deservedly or not I will not say, the reputation of John Cowane is that of a very generous man, who was munificent in his gifts, and if he left the town a carved oak chest, there is no reason why he should not have given the Guildry a gold ring. There is so much plausibility in the suggestion, that I confess I was inclined, along with other people, to accept it as probably the fact, and it is rather a curious coincidence that it is in connection with

(1) Sir Thomas Dick Lauder, in his "Memorial of the Royal Progress in Scotland in 1842," p. 417, has a similar remark, only he omits the word "probably," thus converting a mere supposition into an assertion. I was curious to learn where this information was derived from, and I found that Mr Buist had taken his own account *verbatim* from the *Stirling Journal* of the 16th Sept., 1842, without any acknowledgment, of course, while Sir Thomas Dick Lauder had either cribbed from Mr Buist's book, or had also used the *Journal's* description. I mention the origin of this statement about the Ring, in order to say that although not quite correct, it is a wonderfully good guess, the best indeed which has come under my notice.

John Cowane that the Ring is first mentioned in the Guildry Records, but the entry in the minute is one which puts an end to the conjecture that he was the donor. Cowane was first elected Dean of Guild in 1624, and occupied the office continuously up till 1630. He was again elected in 1631, and was Dean when he died in 1633. During the year he was out of office the auditors' report on his accounts, and after dealing with the finances, they go on to say that John Cowane has delivered to his successor in office, David Stevenson, "the gild box with twa keyes, ane 'gild kist'(1) with the auld wreats and evidents perteening to ye said "gildrie, with the auld handsenzie(2) and twa pin-"sells [pennons], ane great wey baak [bulk for "standard weights] and an irone elwand, and within "ye said gild box *ane gild ring, set with sundry "cullors of stanes, the auld gift of the gildrie*, with "ane extract of ane gift [charter] of wmq^{ll} King "David under ye subscription of wmq^{ll} William "Litstar, with ane great bunshe of wy^{r} wreats per-"teening to ye said gildrie." You will observe that we have here evidence of a conclusive kind with regard to two important facts—First, that the ring mentioned as having been given to David Stevenson was set with stones of various colours, thereby identifying it as the ring that is now on your table; and second, that in John Cowane's time the ring was considered to be an old gift to the Guildry. When Cowane's last set of accounts were audited after his death, his brother Alexander is stated to have delivered to John Scherar, who was appointed interim Dean of Guild, "the gild box "perteening to ye said gildrie, with their gild gift "and wreats perteening to thame togiyr; also, with "*ye gild ring*, cullors, and pensalls within ye said "box." In none of the latter reports by the auditors is any mention made of either the box or the ring. The suggestion that John Cowane was the person who presented the ring to the Guildry being thus distinctly negatived, the question arises—Where then did it come from? My reply to that question is that I have reason to believe the ring was the gift of DAVID BRUCE, KING OF SCOTLAND. In the first place I shall produce the only piece of documentary evidence that exists on the subject,

(1) A new "Kist" was ordered in 1671 for keeping the "writ. and evidents of the Guildry."

(2) *Handsenzie*—Ensign or standard. The colours of the flag were red and yellow, with a white St Andrew's cross "fra neuk to neuk."—Guildry Minutes.

so far as I know, to prove at one time the ring was known as "King David's Ring;" but before doing so, a few words of introduction are necessary. Throughout the seventeenth century the ancient restrictions on trade in Scotland were felt to be a great grievance, and there was a continual struggle between what were called "unfree traders" on the one hand, and the chartered incorporations on the other. The Court of Session records during that period are almost wholly occupied with disputes of this kind, and Stirling seems to have had an ample share of them. One of these lawsuits arose in this way. In October, 1696, the merchants complained that a glover, called Alexander Cudbert, was encroaching on the Guildry's privileges, by keeping an open shop and selling brandy, wine, rock, sugar, raisins, and other staple commodities. The offender was summoned to appear before the Provost and Bailies, and he obeyed the summons, but in a defiant spirit. He at once confessed to selling brandy and other things, but, on being asked if he would desist it time coming, he answered, "in hectoring expressions," that he would continue to sell, "say the contrary who would, and refused to subscribe his confession." The Guild Council, whose minute I have been quoting from, then called on Cudbert to "enact himself" that he would desist from encroaching on the privileges of the Guildry, which he altogether refused to do; whereupon they applied to the Magistrates present that he might be charged to ward (i.e., sent to prison) until he subscribed the said act. Cudbert, who appears to have been a man of great resolution, raised an action of suspension against the Magistrates, alleging that the merchants and crafts had their several jurisdictions, to which they only were liable. The craftsmen were not liable to the jurisdiction of the merchants, nor the merchants to that of the crafts. The Guildry sent the Dean, with John Dick, ex-Provost, to Edinburgh, to do what they could to stop the suspension, and now we come to the evidence about the ring to which I referred. Perhaps I had better give the extract minute of the Guildry *verbatim*:—

> "Gild Council of the Burghe of Sterling holden in the Clerk's Chamber the xxx day of December 1696 by Mr Francis Napier Provost (1) (upon ane express from the D

(1) Francis Napier of Craigannet was a nephew of the famous Napier of Merchiston, inventor of logarithms. He died at Stirling in 1713, and his great great grandson died unmarried so lately as 1874. Provost Napier's only daughter Catherine married another Provost of Stirling, Provost James Christie and from them are descended the families of

of Gild who is at Edr.) and the rest of the Gild Council.

The qlk day the said Provost having convened the Gild Council upon receipt of a lyne from the D of Gild who is for [the] present at Edr. for the defence of the Gildrie's priviledge against the Trades for sending east to Edr. King David's chartore in favoures of the Gildrie, *with the great Ring gifted by him to them*, for evidencing the antiquity and right of the Gildrie, the said Gild Council have instantlie delivered to David Moir, servitor to the said D of Gild ane attested double of the foresaid chartore with King David's Ring, as also ane principal chartore granted by King James to the Gildrie that the same may be produced to the effect foresaid."

In order to complete the episode, allow me to quote another minute dated 30th Jan., 1697:—

"The Dean with Provost Napier and Provost Dick reported that after a full debate of the matter *in presentia*, the Lords of Session had sustained the declarator raised by the merchants and declared that a tradesman could not merchandize unless he renounced his trade and entered with the Guildry and that the Dean of Guild Court may attack and apprehend a tradesman transgressing and upon application to the Magistrates might punish him. The Dean reproduced in face of Court the double of King David's charter with *King David's Ring, gifted to the Guildry*, and King James V. principal charter in favour of the Guildry (1) all which with the information and answers by the merchants and Trades *hinc inde* which are printed, are appointed to be put immediately into the guild box."

The second of these minutes has no rubrie, and the rubrie of the first is, "Act for sending some of the Gildrie's evidents to Edr." To the absence of any mention of the ring in the margin I attribute the fact that the minutes in question have escaped the notice of previous examiners of the records. I need scarcely say that it was this discovery which led me to make inquiries in other directions for confirmatory proof, and I now proceed to lay the results of my researches before you, although I fear some of the details into which it is necessary to enter may prove rather dry. The reign of David II. has justly been described by Mr Tytler as one of the darkest periods of Scottish history, and we cannot expect to find very easily sure data to go upon in an inquiry like the present. There were no newspapers in these days to chronicle every movement of the Sovereign, and record every public event. We are even denied the help of these invaluable old

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the Napier—Christies, the Napier—Christie Burtons and the Christie Burtons. William, Provost Christie's sixth son was a member of the Town Council, and was one of the eight burgesses who established the Stirling Bank in 1779. His property was bequeathed to his relative Michael Connal also a Stirling Provost—Roger's "Geneological Memoirs of the House of Christie."

(1) This charter is not to be found. I have a note that it was dated 1540.

records, the Lord High Treasurer's accounts, and the Register of the Privy Council, which enabled the student of Scottish history to follow the Jameses almost everywhere they went, and to prove dates with incontestable accuracy. There must therefore be a certain degree of speculativeness in any statements put forward as to this obscure period, and to be dogmatic in assertion would not only be wrong; it would also be ridiculous. Where then can we turn for the evidence we desire? The association of the Guildry Ring with a charter in the auditor's reports and minutes I have read is perhaps quite accidental, but it affords a clue which one is only too glad to lay hold of. From the most remote times the use of the ring as a symbol of investiture may be traced in our own and other lands. There is reason to believe that it had some such meaning among the Israelites of old, (1) and in New Testament times the father of the prodigal son is said to have put a ring on his hand, probably as a sign of his re-instatement in his filial rights and privileges. There is a survival of the custom in the investiture of British sovereigns *per annulum* or by the ring, which is an important part of our present coronation ceremonial. In a curious work by Mr Jones, F.S.A., on "Finger-Ring Lore," will be found numerous instances of secular investiture by the ring, and I need not take up your time by quotation. He remarks that the charters given by the early English Kings received the royal confirmation by the ring. Richard Cœur-de-Lion, in a charter relating to the exchange of Andeli in Normandy, for other properties, passed his ring, in sign of investiture, in the silk threads suspended to the parchment. This ring was still attached to the charter in 1666, but afterwards disappeared. Private individuals used the ring in a similar way. Thus Dugdale narrates that William de Balmers gave certain lands to St Paul's Cathedral, and at the same time directed that his gold ring, set with a ruby, should, together with the seal, be affixed to the charter for ever. Our Scottish writers on legal antiquities do not fail to notice investitures by peculiar and appropriate symbols, among which the ring is specially mentioned. The late Mr Cosmo Innes says:—"We feel an interest in the famous Emerald charter of Douglas, for the sake both of the giver and receiver. King Robert Bruce gave to his friend, the good Sir James of Douglas, all his

(1) Jer. xxxii., v. 10.

lands in free regality, and invested him with a ring, containing a stone which is called 'emeraude,' put by the King's own hand on Douglas's finger, which was to be the manner of taking of seisin for his successors."(1) I do not think it can be said we are assuming too much in supposing that King Robert's son may have given a ring to the Stirling Guildry as a symbol of investiture in the rights granted to them by charter. Our next step is to find out whether any charter is in existence, which may be accurately described as King David's gift to the Guildry. The inventory of deeds belonging to the town, which, through the courtesy of Mr Galbraith, Town Clerk, and Mr Cowan, his deputy, I have had the opportunity of examining, mentions several charters of David II., but the charter called "King David's chartere in favoures of the Gildrie" is not among them. I shall have something to say about David's first charter to the town, which is the earliest of our existing muniments, but meanwhile let us go in search of the document referred to in the Guildry Records. Unfortunately the Guildry possess no original charters or ancient writs of any kind; they have gone amissing, or have been carried away probably during some disturbed period of local history. There is, however, a volume containing copies of old deeds connected with the Guildry, and the first one in the book is a copy of a charter by David II., which there need be no hesitation in accepting as the charter mentioned in the minutes of 1696 and 1697. I am glad to say that I am able to give a satisfactory account of this charter. It is not a charter in favour of Stirling, and that is perhaps the reason why it has not been preserved along with others in the Town Clerk's office. It is what is called a common charter in favour of the whole burgesses of Scotland, and is dated at Perth, the 28th of March, in the 34th year of David's reign. For some reason which is still a mystery, notwithstanding the researches of antiquaries, notably of the present Marquis of Bute, there is in all the charters and public documents of David II., dated after his return from England, a difference between the *annus regni* and the *annus domini*, the former falling short of the latter by one year.(2) The charter in question ought, therefore, to bear that it was given in the 35th year of the monarch's reign, that is 1364. At the

(1) Lectures on Scotch Legal Antiquities, p. 88.
(2) Cosmo Innes—Preface to "Acts of Parliament of Scotland" and "Legal Antiquities."

end of the sixteenth century, on the 20th December, 1600, the Stirling Town Council appointed two of the bailies to "pas to the burgh of Perth and these earnestlie to insist and deale with the Prouost, Baillies, and Counsall thairof for the len and use of the commoun chartore and evident grantet to the merchantis and inhabitantis of the haill free burghis of this realme by King David, the —— which is of date the —— to the effect the said euident may be produced and used befoir the Lordis of Sessioun in the action and caus of suspension persewit be the induellaries of Falkirk and Airth agains the Prouest Baillies and Counsall of the said burt of Striveling." We learn from this minute of the Council that the charter was to be put to the very same purpose for which the copy of it was sent to Edinburgh in 1696. The Council got possession of the precious document, which is called "Sanct Johnstone's Euident," on account of its being dated at Perth, and they pledged themselves to re-deliver it to the Perth authorities. This pledge they neglected to redeem, as we find from the records of the Convention of Royal Burghs. In 1602, the burgh of Perth was ordained to deliver the charter to the agent of the Convention to get it "transumed" before the Lords of Session, but Perth alleged that Stirling had possession of it, and accordingly, in the followiug year, Stirling was told to give it up, which order was duly obeyed, and by a judicial proceeding on the 4th May, 1605, the "originall auld chartour" was transumed and ordained to be inserted in the Books of Council in authentic form *ad perpetuam rei memoriam*, the Clerk of the Register being ordered to send a certified copy to the Convention. The original document is, no doubt, in the Register House, while the judicial transumpt, and a translation of the charter, are preserved in the archives of the City of Edinburgh. These are printed in the appendix to the first volume of the Records of the Convention, and the Latin original may also be seen in a little work, published in 1707, and entitled "The Privileges of the Royal Burrows." As the translation in the Guildry's copy is entirely different from the Edinburgh one, it may be conjectured that the "double" used in 1696 was made when the original was in the hands of the Town Council. Was the Guildry Ring given by King David along with this charter? There is not wanting evidence which could be used in support of an affirmative reply to this question. At the date of the charter the King had not been

many months married to his second wife, Margaret Logie. This marriage was not a popular one, for reasons which we need not enter into here, and it was good policy on the part of David to secure the support of the royal burghs by substantial concessions of privileges. Stirling was a favourite residence of the King—he appears to have held several of his birthdays here—and the Exchequer Rolls(1) show that about the year 1364 David made a purchase of jewellery to the extent of £75 of our present currency from Nicholas, one of the Italian artificers, whom he brought to Scotland to work the precious metals. But while giving these circumstances their full weight, and while declining to reject the theory that may be based upon them as untenable, I feel strongly the force of the objection that the charter of 1364 was not a gift to Stirling, but only gave to the Stirling merchants privileges which their brethren in other burghs equally enjoyed. There is also room for the suspicion that this common charter was not the "gild gift" associated with the ring by the auditors of John Cowane's accounts in 1630 and 1633, for there is not a word about the Guildry in it, although it seems that the Guildry in 1696 thought it was the same. It is by no means improbable that the document was lost in the interval. The charter to which I prefer to attach the gift of the ring is one I have already alluded to as the earliest of our existing charters. It is a charter of confirmation by David II., and is dated at Scone the 17th October, in the 31st year of his reign. The uncertainty of date attaching to documents of this period is illustrated by the fact that in the various inventories three different years—1359, 1360, and 1361—are set down as the time this charter was granted, while the day of the month also varies. To these difficulties has to be added the incomplete designation in the deed itself of the Sovereign whose charter David confirms. The style employed is simply "Our predecessor Alexander of perpetual memory," but as three of David Bruce's predecessors were named Alexander, it takes some time and trouble to find out which of them is meant. The date of the charter confirmed is the 18th August, in the 12th year of Alexander's reign, and you will not be surprised to learn that, like the confirming charter, it has been ascribed to three different years, viz., to 1119, the 12th year of Alexander I.'s reign ; and to

(1) Vol. ii. p. 160.

1226, the 12th year of Alexander II.'s reign; and to 1261, the 12th year of Alexander III.'s reign. There is one good reason why the true date cannot be the first-mentioned year, and that is in Alexander I.'s reign the practice of dating charters, except by the day of the month, had not been introduced, and even in the reign of David I., Malcolm IV., and William the Lion the cases are extremely rare in which the charters bear the regnal year or the year of nativity. We should therefore be pretty safe in pronouncing any charter professing to come from Alexander I., and having a date, to be a forgery. In these circumstances it is not a very bold statement to make, although it may appear somewhat startling at first, that all our histories are wrong in attributing the earliest Stirling charters to Alexander I., and that the Guildry, in adopting the year 1119, as the date of their institution, have been misled by the reverend gentleman who compiled the Old Statistical Account, and who has been accepted as an authority by all succeeding historians. Nimmo, in his "History of Stirlingshire," had remarked that Stirling first appears as a royal burgh under David I.,—a perfectly correct statement—but unfortunately, Mr Macgregor Stirling not only changed the name of the monarch to Alexander I., but gave his reason for doing so in a note, and that reason was the date of the charter we are at present considering, as given in the Statistical Account. The publication of ecclesiastical chartularies, and of the contents of private charter-chests, enables us to fix the dates of public documents with greater certainty than the old writers could do. The lists of witnesses appended to royal charters are trustworthy guides, by whose assistance we can easily determine the period at which these charters were granted, and in many cases establish their precise date. There are ten witnesses to this charter of King Alexander, and by comparison with charters and other documents in the National MSS. of Scotland and elsewhere, I have satisfied myself as to the period during which five of the witnesses lived, while I have no doubt that with more time than I could afford the whole of them might have been traced. The first witness is "Thomas of Stirling, our Chancellor." This dignitary was Archdeacon of Glasgow, and was made Chancellor on the retirement or death of William de Bosco in 1226. The 12th year of Alexander II.'s reign was the first, and apparently the last year of Thomas of Stirling's

Chancellorship. Henry of Balliol, the next witness, was Chamberlain from 1223, or earlier, to 1229, and it is as Chamberlain that he witnesses the Stirling charter. Walter Comyn, Earl of Menteith, who follows, is a witness to the charter granted to the City of Aberdeen by Alexander II. Henry of Brechin, son of Earl David, attests the acts of that Monarch's Councils in 1225 and 1227, and Walter Bisset, the last on the list, witnesses another charter by the same King. It is therefore placed beyond the possibility of doubt that it was Alexander II. who granted the Stirling charter, and that its true date is 18th August, 1226. Of course Stirling was a royal burgh long before that time. Its origin is lost in the mists of antiquity. It was not, however, until the reign of William the Lion that royal burghs asked for charters, not for the purpose of erecting them into the burghs, but for the purpose of confirming and securing the privileges they had previously enjoyed without any grant in writing. It is very probable, nay, it is almost certain, that Stirling had a guild of merchants as early as David I.'s reign, if not earlier, although the burgh did not owe its rise to trade, but was from the first a King's burgh; but the Stirling Guildry was not incorporated by royal charter until charters became a usual gift to burghs; and if, instead of the present legend on their seal, "Instituted by Alexander I., 1119," they adopt the inscription, "Incorporated by Alexander II., 1226," they can defy criticism. The terms of our most ancient charter are very similar to those of a charter granted to the burgh of Perth by William the Lion, Alexander's father, and of another granted to the City of Aberdeen by Alexander himself. The original of David II.'s confirming charter is at present in the hands of Dr Marwick of Glasgow, but I have here a translation, made in the seventeenth century, and docqueted, "King David's Charter to the Gildrie of Sterling Englished," an expression which proves that it was considered a "gild gift" by the translator at any rate. The charter of Alexander II., confirmed by David II. (and it is only by this confirmation that we know the terms of the older deed, for the original is lost), gives to the burgesses of Stirling "ane mercat day, to witt the Saturnday of ewerie week," and prohibits stranger merchants from buying or selling at the Stirling market, except between "the day of the Lordis ascension and St Peter's Day," i.e., between 3d May and 29th June. Then follows a curious provision, which is also found in

William the Lion's charter to Perth and Alexander II's. to Aberdeen :—"We discharge and prohibit lykwayis that thair be no vyne tavern in any village of ye sherifdome of Stirling, except that he be a knyght that is master of ye village and remaining wtin the same and that yr be bot ane onlye in that village and no more." This is the earliest Permissive Bill we hear of, but I am afraid it was not enforced to promote sobriety, but to give the merchants of Stirling a monopoly of wine selling. "We grant lykwayis to our sd burgesses of Stirling that they shall have their gildrie of merds excepting out of the same cloathe wakers and dyceplayers.(1) We discharge and prohibit lykwayis stricklie that no man dwelling within the sherifdome of Stirling without the burt shall make any cloathe ather litted or schorne after it is waked or cause make the same except our burgesses of Stirling who are of ye guildrie of ye merds and who sall contribute withe our burgesses of ye sd burt to our helpe and supplie except those who before this hathe peware and libertie of the same by yr awne charteres." All these privileges are ratified by David II's charter, and it may be interesting to note that among the witnesses to the latter was Robert the Steward of Scotland, afterwards King Robert the Second. I have gone into these details, at the risk of being tedious, with the view of showing that to this charter the term "guild gift" may be applied with peculiar fitness, and that the presentation to the Guildry of a ring along with it would have been quite appropriate. King David had as great reasons for propitating the burgesses by means of gifts in 1361 as he had in 1364. The third instalment of his ransom money had been punctually paid to the King of England the previous year, but the nation felt itself to be overtaxed, and there was general disaffection. While the King was invoking the aid of the Pope to compel the clergy to contribute, the burghs were paying double custom on hides, and triple custom on woolfells and sacks of wool, the whole of which, for the first three years, went to reduce the enormous debt on the country, but afterwards it was complained that much of it was swallowed up by David's private expenses. The people got tired of this heavy impost, and looked to France for aid, which was promised but not given, and eventually a civil war took place, which, but for the King's promptitude and energy, might have cost him his

(1) *Fullonibus et telariis*—Fullers and weavers. This curious exception is also made in the Perth and Aberdeen char-

throne (1). Before the crisis came, David did what he could to secure the loyalty of Stirling by ratifying Alexander's charter to the burgh, and it is a remarkable coincidence, to say the least, that the Exchequer Rolls, which are a mine of information, entirely unworked as far as Stirling is concerned, indicate an official visit to the town by the King about the time the charter was granted at Scone. In the Stirling custumar's account for the period from 3d June, 1361, to 10th May, 1362, credit is taken for payment of viii *li.* to John de Burgh, and x *li.* to John de Forrester, King's macers, as their fees, which would not have been paid unless these gentlemen had accompanied their master on some state occasion. Indeed, only one other payment of a similar kind was made out of the burgh funds during the whole of David's reign. Is it too extravagant a speculation to suggest that the entry referred to marks the visit of the King to Stirling for the purpose of presenting the Guildry with his charter and his ring? One of the maces mentioned above should not be passed over without some notice, however brief. John de Burgh was a wealthy Stirling merchant, who, along with William Sauser, signed, on behalf of the burgh, "The Obligation of the Towns and Burgesses of the Kingdom of Scotland anent the ransom of King David II., A.D. 1357." He appears to have afterwards become a Royal favourite, receiving the honour of knighthood, and the appointment of one of the King's mace-bearers. David also granted him the ferry on the water of the Forth near Stirling (2), and he seems to have held during his life the lands of Culcuchone and Tulchgorme in Stirlingshire (3), and Lyandcors in the barony of Renfrew (4). Lastly (some may think it should have been firstly), we come to the evidence of the ring itself. It has all the appearance of being a genuine antique, but it is so well preserved that a jeweller, to whom I had Dean of Guild Low's permission to show it, actually thought it was made of some base metal, gilded over. This opinion was founded on the ap-

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ters. "In England so late as the reign of Edward I., the burghs of Winchester, Marlborough, Oxford, Beverley, and London, set obstacles in the way of ambitious weavers and fullers who getting rich sought admission into the merchant guild."—Riley's "Guildhall Liber Custumarum," referred to in Innes' Preface to "Ancient Laws and Customs of the Burghs of Scotland" p. xlvii. *Note.*

(1) G. Burnet, Lyon King of Arms—"Exchequer Rolls," vol. 1. p. liii.

(2) Robertson's Index, p. 63.

(3) *Ib.* p. 86.

(4) *Ib.* p. 115.

pearance of the edges of the hoop, which are almost as sharp as if the ring was manufactured yesterday. The explanation is, that in all probability the ring has never been worn on the finger, but kept with great care in a box, and the manner in which it is worn now-a-days, suspended by a chain, does not wear the gold as if it were put on the fore-finger, for which it is evidently intended. The ring weighs exactly half-an-ounce. The hoop is of pure gold, and the stones are set in the form of a cross. Only two of the stones—the ruby and the garnet —are real gems, and of the other three, two are paste and one is crystal. It is not unlikely that when the ring was given all the stones were real, and that some of them were afterwards removed or fell out, their place being filled up with imitations. I think one sign of the ring's antiquity is the primitive way the setting of the centre stone—a paste emerald—is kept in its place. You will feel it a little loose, and at first I thought it was the stone that moved when touched, but on closer examination I found that the centre piece has attached to it two small gold pins, which, being passed through a hole and bent down, prevent it from falling out. This precaution may have been taken after the loss of the original stone. The inscription is cut on the outside of the hoop, in bold Roman capitals, and is as follows :—"YIS·FOR YE·DEINE·OF·YE·GEILD·OF·STIRLING." The engraver has apparently miscalculated his space, as the final word is cramped, compared with the rest of the inscription. These words may not have been inscribed on the ring at the time of its presentation, but they are undoubtedly of ancient date. The spelling of "Stirling" seems modern, but it is spelt the same way in the Keir papers under the year 1433, and probable a little investigation would produce an earlier example. "Geild" is a very old form of "Guild." It does not appear in the Guildry minutes, which begin in 1592, the spelling being invariably "Gild" down to the 27th September, 1746, when the letter "u" is first inserted. "Deine," for Dean, is also older than the records, the spelling at first being "Den," and afterwards "Deane." There is therefore nothing inconsistent in the inscription on the ring with the supposition that it was the gift of David II. Let me now summarise the evidence in support of this theory. First, there is the distinct statement contained in the minutes of the Guildry that in 1630 the ring was considered to be an "auld gift" to that incor-

poration. Then we have the still stronger assertion in 1696 that the ring was given to the Guildry by King David, showing the universally received tradition, against the truth of which nothing can be alleged. In the next place, we have the custom of giving rings with royal and other charters, and the existence of a charter to the Guildry by the King whose name is associated with the ring. Further, it is proved that David Bruce visited Stirling in state about the time the charter was granted, and lastly, there are the presence and appearance of the ring itself. To my mind there are not many things referrable to remote times regarding which so much and so strong evidence could be adduced, and I am sure that antiquaries would in many cases be only too glad if they could lay their hands on similar proof to support their speculations. If the origin of the Ring I have endeavoured to establish be the true one, the importance of the relic will readily be recognised. With the exception of the remains of the Roman occupation, and perhaps part of the ruins of Cambuskenneth Abbey, we have nothing in the district which can claim a higher antiquity. The ring is older than the Stirling Jug, the earliest mention of which occurs in an Act of Parliament, dated 1457 (usually quoted 1437), though there can be little doubt that the measure was in existence before that time. The ring is older than the oldest portion of Stirling Castle; it was in the possession of the Guildry before the West Church was built, and before the River Forth was spanned by the Old Bridge. It belongs to the middle ages, and, as far as my knowledge extends, it is quite unique. No other burgh in Scotland, no other incorporation of any kind, can boast of a similar royal gift. The ring has also a special interest, on account of the Sovereign from whose hands the Stirling Guildry received it. David II. was not a King to be proud of perhaps; nor was his reign a very happy or prosperous one for his country. But we can never forget that he was the son of Robert the Bruce, whose most glorious achievement, which secured the independence of Scotland, took place within sight of our good old town; and whose remains were carried through Stirling on their way to their last resting-place in Dunfermline Abbey. For the father's sake we cannot help respecting the son, and in the relic before us we rejoice to recognise a symbol of that connection between Stirling and the hallowed name of Bruce, which

forms not the least sacred of its historical associations. Were not this paper of sufficient length already, I should like to sketch for you our ancient royal burgh in the time of the donor of the Guildry Ring—its rude fortifications, its wooden parish church, the cluster of houses or rather huts, on the Castlehill, in which dwelt the merchants desendants of the Flemings who came over to Scotland during the long peace, the narrow and tortuous streets or wynds, one of which may have led to the Dominican monastery founded by Alexander II., and another may have ended in a foot-path leading down to the champaign country and extending to the Abbey ferry; the stout burghers, quaintly dressed, and having in their booths an axe, or a spear, or a sword, or a cross-bow, always ready for use; the knightly tournaments under the eyes of beauty; the manly sports of the common people; the fast-days and feast-days, the revellings and riotings; the simple manners and customs of the inhabitants; their religious rites and superstitions, their virtues and vices. But I must leave to your imaginations to fill up the details of social life in Stirling in the 14th century, and I conclude this notice of the Guildry Ring by expressing the hope, or rather the conviction, that in virtue of the new significance and value which I trust it has now received, this royal gift will be more widely known, and more highly esteemed in the future than it has been in the past, although I am sure it cannot be more carefully preserved than, to their credit be it said, the Guildry have kept it upwards of 500 years.

The usual monthly meeting of the Society was held in the Smith Institute, on Thursday evening, 3d May—Mr Croall presiding. The attendance was small. It was intimated that the Council had fixed excursions for May, as follows:—On Saturday, 12th May, to Larbert and Torwood; and on the Queen's birthday, to Loch Leven. Mr D. Chrystal, the secretary, stated that the first excursion of the season, that to Doune, had, owing to the weather, been abandoned. He was instructed by the Council to ask every member of the Society to attend these excursions. Mr Gilbert MacDougall read a paper on "Rare Plants of the District," and Mr Croall the first of a series on "Insects: their Life and Transformation." Mr Croall submitted to the meeting a stone axe head of peculiar formation,

presented to the Club by Mr George Pollock, seed merchant, Stirling, found on the estate of Blairvoir, Drymen. The sides of the axe head, instead of being polished into the segment of a circle, were worked in planes with sharp angles. The following papers were read :—

NOTES ON LOCAL PLANTS

(By Gilbert M'Dougall.)

Nothing gives the naturalist, whatever section of natural history he or she may follow after, more enjoyment than occasionally picking up what, to him or her, is a new *species*. But if it is a new *genus* what a thrill of emotion passes through one's whole frame, that none but those who have enjoyed it can have any conception. Who can describe the feelings of Mr W. Whitehead when he first saw the Wellingtonia, *Sequoia gigantea*, towering far above its fellows, a Goliath in the vegetable world, and also a Patriarch, for some of the specimens on the Sierra Nevada are supposed to be more ancient than the days of Noah. There is some dispute about who first discovered the Wellingtonia; a writer in *Blackwood's Magazine* says it was discovered by a Mr Dowd in 1850. The settlement of the matter is generally ascribed to Mr J. M. Wooster, who states that a Mr W. Whitehead was the real discoverer in 1850. I have read of D'Audobon, the great American naturalist, how sitting one night in a friend's house arranging specimens of the day's gathering, the window of his room was open and a candle burning upon the table, when all at once a great uproar proceeded from the direction of his apartment, which drew the attention of his "host" toward him to find out what ailed the man. We may judge of his "host's" surprise, when on entering he found D'Audobon acting more like a madman than a sane one, with his best fiddle smashed in endeavouring to strike down some *Bats* that were attracted by the lighted candle and got access by the open window into the room. When remonstrated with for the usage given to the fiddle, he made no reply, but asked for assistance to procure a specimen, for it was a new *species*. What then must have been the feelings of the man when, to procure a *bat*, he broke his friend's fiddle? The naturalist's sensibility is even more intensified when the object of his or her find is a *rara* or an *eremos*. Therefore, for the benefit of those members of our society who are anxious to procure this season for themselves some of the rarities and her-

mits of the vegetable kingdom, I will cull a few, and endeavour to point out where such are to be found. Ben Lawers is easy of access from Stirling, and there the ardent student of nature can gather a few plants found nowhere else. The moss *Gymnostomum cæspitosum* and the lichen *Verrucaria Hookeri* are said to be found nowhere else in the world. *Saxifraga cernua* is met with on the summit of the Ben, the only *locale* in Britain. *Alsine rubella* and *Draba rupestris* can be collected only here, and in a place in Sutherlandshire. *Myosotis alpestris* is also peculiar to the Ben. Here and the surrounding hills and glens used to be the favourite botanizing ground of the late John Sadler and his friends; and in one of these rambles he added two new plants, *Carex frigida* and *Salix Sadleri*, to the British flora. His companion on that occasion, Dr Stuart of Chirnside, writing lately, speaks thus of the discovery:—"We had almost crept along the precipitous ledges running from the break-neck waterfall, at the head of Glen Callater, which extends towards the weird-looking, inky tarn, gathering *Carex rupestris* and other rarities. The day was grey and very windy, and our footing on such steep ground was far from secure. John Sadler took to the steep grassy ledges facing the north-east side of the lake, and ascended for about 1000 feet, from one ledge to another. The climbing was not so difficult, but the getting down was another matter, especially as the way was obscure, and not without risk did he make the descent, bringing with him cuttings of the willow and a *Carex*, never before gathered nearer than the Swiss Alps, and named *Carex frigida*. Both were submitted to Dr Boswell Syme, LL.D., who pronounced the willow new to Britain, and named it *Salix Sadleri*, after the discoverer; and the Carex also proved a *species* new for Britain. A plant of the willow is growing on the Rock Garden, Botanic Gardens, Edinburgh, and the Carex has also been cultivated with success." We meet with *Oxytropis campestris* on but one cliff of Clova in Forfarshire. *Trifolium Bocconi's* only home is on the Lizards in Cornwall. The sea pink, *Armeria maritima*, and the scurvy grass, *Cochlearia Grœnlandica*, two saline loving plants, whose proper abode is the seashore, occur also upon the summit of our Highland mountains, a living memorial of the period when the crest of these bens appeared above and remained for a time surrounded by a vast expanse of ocean. In August, 1879, our president, Messrs

Robert Kidston, and John Morrison, had a trip to Tyndrum and neighbourhood, and, among other rarities, they collected on Ben Luie the few flowered Carex, *Carex pauciflora*; the compound-headed Elyne, *Elyne caricina*, and the mossy Cherleria, *Cherleria sedoides*. But one plant of Mr Kidston's gathering, an orange variety of the Yellow Mountain Saxifrage, *Saxifrage aizoides*, var. *aurantiaca*, eclipsed all the others for rarity, because it is only the second time there is any record of it having been found in Scotland. These are a few of Flora's rarest gems, most of which are to be found clothing one solitary Ben with their verdure. I will now turn my wandering footsteps to see if no "Local Plants" are to be found upon our own hunting ground. The Wallflower, *Cheiranthus Cheiri*, is to be seen in early summer adorning the weather-beaten rocks of our Castle in a mantle of gold. The Henbane, *Hyoscyamus niger*, and the Deadly Nightshade, *Atropa Belladona*, two Solanaceous plants, dangerous members of a dangerous family, grow between the castle rock and the high walk. Two plants of the latter used to grow among some stones alongside of the wall of the Butt Park, next to the Raploch, and a few plants are also found among the boulders upon the Abbey Craig. The wild cabbage, *Brassica oleracea*, bears little resemblance to the huge heads we sometimes see in the greengrocers, and the parsley, *Petroselinum sativum*, would have but a poor chance of carrying off a card at any village flower show, both are to be found near to the foot of the rocks. Also the wild lettuce, *Lactuca virosa*, can be procured in the near vicinity, as it should be for convenience to the cook when gathering. But I doubt if any salad connoisseur would thank you for your delicacy. The Snapdragon *Antirrhinum majus* is in several places growing out of the wall. Two Stonecrops, *Sedum album* and *Sedum reflexum*, are to be seen creeping over the rocks beneath the Lady's Look-out. All these are doubtful natives, and must at one time have made their escape from the cultivator's care, from the gardens above, and through years of seeding and growing, have become established wildings. *Lamium purpureum*, variety *album*, grows lower down than the Stonecrops, close to the walk among the sloe bushes. Further along on the same side of the path, *Convolvulus arvensis* with its white and pink striped flowers, rambles over the broken bank. Its companion, *Convolvulus sepium*, a pretty flower, but a noxious weed, for its roots extend about as far

beneath the surface as do its stems above, is luxuriating in a ditch near to the Manse at Menstry. *Erodium cicutarium* delights in a small patch of soil midway between the two walks near to the large mass of boulder, and on two or three rocky knolls round the King's Park. The Sweet Violet, *Viola odorata*, is well nigh extinct from its old haunts near to the Castle, but is still plentiful outside of the orchard wall near to the Abbey Tower. Of *Gagea lutea* only a very few specimens have been found, and that among the bushes near to the Butts in the King's Park. It resembles the Star of Bethlehem, *Ornithogalum umbulatum*, in flower, but the colour is yellowish green, and a variety of it I looked upon it to be when first I made its acquaintance in Ballied a few years ago. The Columbine, *Aquilegia vulgaris*, occasionally met with on the Gowan Hills, and we have seen it on road sides to the west of Craigforth, but we fear it can only be an escape from the cultivator's care in either locality. Beneath the Powder Magazine among the rocks, wont to be a habitat for the evergreen Alkanet, *Anchusa semperverens*, but the improvements made by blasting to widen the footpath have caused it to disappear from there. Still an occasional plant is found near to its old haunts. *Solanum Dulcumara*, the Bitter Sweet (why so named I do not know), fond of hedgerows for support to its weak stems, is very locally distributed, seldom more than a plant or two being found together. One plant is growing among some briers on the old back road from the Raploch to Craigforth, and several are rambling in the hedge at the roadside near to Buchlyvie Station. When accompanying our President upon a botanical tour in that neighbourhood, we came upon a plant of it growing among a clump of scrubby willows fully half a mile in from the out edge of Flanders (Offerance) Moss. We also came upon a plant of the common nettle, *Urtica dioica*, in the same scrub that we looked upon as rather odd, for the nettle is a social plant, fond of keeping company with man; and few bipeds traverse that trackless waste of nearly 2000 acres of peat from 6 to 9 feet deep, except those borne over its surface on airy wings. Now that the Iron Road has entered within its confines, a few more individuals of the genus *Homo* will pass over its borders, not to stay and admire nature in her humblest and simplest garb, but will pass on in disgust to *lionize*, the ancient clachan of Aberfoyle, and smile at the huge weapon hung upon

a tree, which is said to be the veritable poker used by a certain Bailie upon a memorable occasion. Fashions are ever changing, and so, perhaps, has the make of a poker from the shape of a plough coulter in the days of the said Bailie into the handy article in use to-day.

NOTES ON RECENT SHELLS.

One day lately when working at my calling in the garden at Forglen Cottage, Bridge of Allan, my attention was directed to the bank of the burn which flows through one end of the garden by observing some fragments of oyster shells, *Ostrea edulis*, sticking to it. This led to a farther examination, and presented before you is the labour of a few minutes. Upon measurement I found the bed to be about three feet deep; the shells mixed in *strata* of clay, mud, and a rusty coloured sand. Near to where I took the measurement the bed crops out to the surface and is lost, for the ground between and the Allan is beneath its level. In the field opposite, where the bed terminates, the ground is literally strewn with shells turned up by the plough and by the debris left, shows the river when in flood and high tide lately, to have once again lashed the old sea-beach by its waves. At this point the ground rises rather abruptly, for about thirty yards farther up the stream there appear to be about ten feet of clay above the bed. I inserted my spade into a furrow and turned up this mass of cockle, *Cardium edule*, which you will see is a complete mass of shells of various sizes, and if washed to clear them of mud, some minute *species*, such as *Cylincha cylindracea*, might be found in the debris. A few fragments of the whelk, *Littorina littorea*, were observed to be almost perfect; they are so decayed that they all but go into powder when handled. You have heard so much lately about shells that whether these *Molluscs* were in a state of crawling prior to or coeval with primitive man in those parts I will leave the *savants* to determine. One thing is clear beyond dispute, *i.e.* these beds are neither the accumulation of years from the refuse of bait, nor are they kitchen middens, for these oysters have never been opened, and the smallness of the cockle would cause an amount of toil for little picking. Upon farther examination a few more *species* have been found, but the oyster is the predominating shell. In some parts of the burn it can be collected in barrow loads. For comparison I will place these and those found at the Raploch in

parallel columns, and also to endeavour to stimulate some of our members into action. If what is presented before you is the labour of fifteen minutes stolen off the meal hour, what could not be done by those who have more time at their disposal?

	Raploch.	Forglen.
Scrobicularia piperita	frequent	none.
Cardium edule	plentiful	plent.-small.
Tillina Solidula	scarce	frequent.
Ostrea edulis	fragments	abundant entire
Mytilus edulis	fragments	fragments.
Littorina littorea	plentiful	frequent.
littoralis	plentiful	frequent.
neritoides	plentiful	scarce.
rugosa	plentiful	none.
rudis	frequent	scarce.
Fusus antiquus	scarce	scarce.
Trochus cinereus	scarce	none.
Cylincha cylindracia	frequent	none.
Rissoa ulvae	abundant	none.
Purpura lapillus	none	frequent.
Mangelia teres?	none	scarce.
linearis?	none	scarce.

By the foregoing, the similarity of the two beds or parts of a bed is apparent. As at the present day, in the bays along our coasts we find generally some shells predominant, so in those bygone ages when these now fertile plains, now studded over with the abodes of the hardy and industrious tillers of the soil, were a vast expanse of ocean in which the monsters of the deep might have been seen frolicking as they swam to and fro in pursuit of their daily food. Of those *species* found in the one place and not in the other—five at Raploch and three at Cornton—might by further investigation be found at both places. Twe found at the latter place, our authority in the chair, has not seen in a living state, and the *striæ* through decay being almost obliterated, we, in the meantime have referred to *Mangelia teres* and *M. linearis*. Perhaps some of our members, when enjoying themselves at the coast in summer would, for their own amusement and our edification, but spare a short time daily to pick up all the different shells—two or three of each—they can find, and preserve them carefully until they arrive home, after which our President will look after them and convey to the donors a hearty vote of thanks. One perfect specimen is far better for comparison and identification than all the written descriptions published in books, however accurate they may be.

INSECTS: THEIR LIFE AND TRANSFORMATION.

(By Alex. Croall.)

When we reflect that the phenomena connected

with the planetary world soon procured for them the honours of deity, we might at first feel somewhat astonished that we should have remained so long in ignorance of the laws by which they are governed ; but it must not be forgotten that the cloud of impenetrable mystery, which this veneration had thrown around them, was more than enough to deter the infant mind from attempting to understand much less to explain their true position in the visible creation, and it was not till these mists of superstition began to be swept away by the light of a purer and a holier faith that the truths and beauties of science began to dawn on the emancipated mind. Such being the difficulties with which physiology, astronomy, and their kindred sciences had to encounter, our wonder will be the less that science, which we have chosen as the subject of the present essay, was, until very modern times, almost unheard of and unknown. Such, indeed, is the difficulty involved in the study of this delightful science from the great minuteness of thousands of the species, the singular transformations which they all undergo, and the almost countless aggregate of the whole, that we need not feel astonished if the science be yet in its infancy. Few authors, indeed, there are who carry the arrangement beyond that of genera, hundreds of species have yet been distinguished by no certain character, while hundreds more are yet to be discovered. It is only when all the laws of general physics and those which result from the condition of existence are exhausted that we are reduced to the simple laws of observation. The most effectual method of obtaining these is that of comparison. This consists in successively observing the same bodies in the different positions in which nature places them, or in a mutual comparison of different bodies, until we have ascertained invariable relations between structures and the phenomena they exhibit. These various bodies are kinds of experiments prepared by nature, who adds to, or deducts from each of them different parts just as we might wish to do in our laboratories, shewing us herself at the same time their various results. In this way we finally succeed in establishing certain laws by which these relations are governed, and which are employed like those that are determined by the general sciences. The incorporation of these laws of observation with the general laws, either directly or by the principle of the conditions of existence would complete the system of the natural sciences,

in rendering sensible in all its parts the mutual influence of every being. To this end should those who cultivate these sciences direct all their efforts. All researches of this nature, however, pre-suppose means of distinguishing clearly, and causing others to distinguish the bodies with which they are occupied; otherwise we should be continually confounding them. Natural history then should be based on what is called a system of nature, or a great catalogue in which all created beings have suitable names, may be recognised by distinctive characters, and be arranged in divisions and sub-divisions; themselves named and characterised; in which they may be found. In order that each being may be recognised in this catalogue, it must be accompanied by its character—habits, or properties, which are but momentary or accidental, cannot, then, form its characters; they must be drawn from its structure, or sources the least liable to be acted upon or to change by the action of external circumstances, or disorder and uncertainty must be the only result. When characters sufficiently marked in their outline, and constant in their appearance have been detected in any being, that being is termed a species, and when a number of these have been found sufficiently assimilated to each other, in one or more of their characters, these are arranged together and are called a genus. These are again examined for characters more general in their application, and such characters form the bases of more extensive groups termed orders, which again form classes. More extensive division when practicable and necessary may still be made if required. Life being the most important of all the properties of the beings with which we are acquainted, and consequently the most distinctive of all characters, it has been and still is considered the primary mark of distinction in the kingdom of nature, which thus naturally resolves itself into two grand divisions, *animate* and *inanimate*. But the principle of organization, and consequently the difference between animate and inanimate beings, have been so often referred to, and will have to be so frequently referred to as we proceed, that it would be quite superfluous for me to recapitulate them on the present occasion. I might here remark, however, that though the distinguishing characteristics generally given are sufficiently accurate for general purposes, yet if we begin to analyse these general distinctions, and carry them out to the boundary lines of that section of the animal kingdom which we have

undertaken to define, attempting as we proceed, clearly and accurately to fix the precise line of demarkation that separates it from its allies, we will soon perceive that the task we have undertaken is difficult, if not altogether hopeless. This, indeed, is no less true in the animal than in the vegetable kingdom, and is equally remarkable in the smaller as in the larger groups, which the respective naturalists have attempted to form. Linnæus, for example, is well-known as the author of that arrangement of the vegetable kingdom which goes by his name, the primary divisions of which are made to depend upon the number of stamens generally found in certain families of plants. Valuable, however, as the discovery certainly was, and great as is the facility with which the science of botany can now be studied by its means, yet its celebrated author soon found that it would only imperfectly answer the object that he had in view, and could not be rigorously followed out without separating genera, and even species, the situations of which had never for a moment been questioned. The Salixes or Willows, for instance, form a genus of plants so closely allied to each other in every respect, unless in the number of their stamens, that even Linne himself chose rather to depart from a strict adherence to the system which had been formed, than to do violence, as he conceived, to nature by tearing asunder so natural a group. So little confidence, indeed, can be placed in the number of stamens for a perfect arrangement, that we do not find them constant even in the same individual. In Silene dioica, for instance, as well as in many others, we find them by no means constant either to the number or position of the parts. In this plant we sometimes find stamens and sometimes pistils, and sometimes stamens and pistils together in the same flower. If we now ascend from the vegetable to the animal kingdom, the same apparent disorder, the same defiance of all attempts at systematic arrangement meet us at every step. Take we, for example, that beautiful tribe of Insects, the Lepidoptera, distinguished by the splendidly irridescent colouring of their scaly wings, and we will see that this character does not universally hold, for some of them have the scales so exceedingly minute that they are scarcely perceptible, while in others they almost entirely disappear. The character of the two subdivisions into which they are again formed are equally conflicting. Those that fly during the day are distinguished by their club-

shaped antennæ, while those that fly during the night are described as having them setaceous, or tapering to a point. These characters, however, are not universal, not even in the same species, as some of the males have them club-shaped or claviform, while in the females of the same species they are setaceous. Continental Entomologists have attempted to form the basis of an arrangement of coleopterous insects from the number of the joints of the tarsi; this, too, was found to be defective in the same way as Linne's sexual system of vegetable, as in some species they consisted of 5, while in species of the same genus they were ony 3 or perhaps 4. But why should these discrepancies astonish us, when the distinctions between the animal and vegetable kingdoms themselves have, and not without reason, been so often called in question. True it is that an animal and a plant do at first sight appear to be totally different in every respect, yet if we begin to examine them in all their relations until we reach the approximating confines of the two kingdoms, we shall find that in their two extremes they are so closely allied that the man who will build on no other foundation than that of truth will hesitate before he will form his decision. Cuvier, who has perhaps studied the structure and relations of animals more than any naturalist dead or alive, when speaking of the structure of some of those animals that form the lowest link as yet discovered of animal existence, has the following words:—"*Radiated animals*, approximate to the homogenity of plants, having no very distinct nervous system or particular organs of sense; in some of them it is even difficult to discover a vestige of circulation; their sespiratory organs are almost universally seated on the surface of the body; the intestine in the greater number is a mere sac without issue, and the lowest of the series are nothing but a sort of homogeneous pulp, endowed with motion and sensibility. Locomotion, then, would seem to be the last link of distinction between the animal and the vegetable world. But even this does not seem always to hold good, for there are some of those exceedingly minute creatures that inhabit the cells of coralines as immutably fixed to their little houses as the rowan tree to the craggy rock, or the towering pine to the mountain's brow." With these remarks before us we may now safely proceed to define as well as we may the several classes into which the animal kingdom has been divided, without being discouraged or

disappointed if, after having traced the two allied sections from the one end of the chain to the other, we find on reaching the latter a connecting link which effectually unites them, and defies all our powers of discrimination to identify individuals, either with the one section or with the other. From this, however, we must not conclude that disorder or irregularity is anywhere apparent; this very circumstance proves the reverse, for although every link in the chain has not yet been discovered, the occasional breaks in that beautiful series are fast filling up, and with the many aids that are now within our reach, and these are constantly increasing, they will continue to be so till every link has been secured, and we can descend in one uninterrupted gradation from man, the chief and lord of the creation, down to those all but infinately minute beings which the eye of man, with all its resources, has not yet been able to investigate. The primary divisions into which the animal kingdom has been divided, are four, namely—Vertebrata, Molusca, Articulata, and Radiata. These four sections comprehend all those beings which are generally considered as exhibiting, more or less perfectly, the properties of animal life. The characters by which the first of these, the Vertebrata, are recognised, are in general well defined. These have a real and distinct skeleton, in the principal column of which is mostly situated the medullary masses—they have all red blood propelled through their bodies by the muscular action of the heart, the organs of sight, of hearing, seeing, and smelling, are distinct; they have never more than four limbs, and the distribution of the nervous system is nearly similar in them all. In the second great division *(Mollusca)*, there is no real skeleton, and consequently the nerves are attached to the skin. In this division only two of the organs of sense have been detected, and that only in some of the families, for in many no organ of taste has yet been discovered, though organs of sight have been observed in them all. Only one family possess that of hearing. The digestive and circulating system do not materially differ from the preceeding class. To this division belong the shell-fish that are so plentiful on all our coasts and in every ditch. In the third division *(The Articulata)* the nervous system consists of two chords running along the centre of the body in a longitudinal direction. Here is no regular circulation, and respiration is carried on by means of openings along the sides of the body, or distributed over its surface, the

organ of hearing has been detected only in one family, but those of taste and of sight are quite apparent. This division comprehends all the countless myriads of insects and worms, to which we propose in the sequel more particularly to direct your attention. To the fourth and last division *(The Radiata)* belong all those animals generally known by the name of zoophytes. In this extensive division the organs of sense and motion, instead of being arranged along the sides of a central axis, are disposed around a centre in the form of rays. The sanguineous circulation, in many of them at least, almost entirely disappears; the respiratory organs, like those of plants, are situated on the surface of the body, and in most of them the alimentary canal is reduced to a mere sac, which receives and excludes its aliments at one and the same opening. Even these characters, however, in many of them can hardly be recognised, as they consist of a soft homogeneous mass, in which the organization is with the greatest difficulty perceptible. Thus we have attempted to give you an idea of the primary arrangement of animated nature, and the position which insects hold in that arrangement. We shall again resume the subject on a future occasion as opportunity serves, and attempt an outline of the history of the science itself, interwoven with notices of the most celebrated naturalists who have figured in its annals. The subject of Entomology is one which will afford us ample scope for investigation, and the sources of information and pleasure which it opens up to the mind are almost as countless as the beings of which it treats. Their forms, their colours, their habits, and above all the singular instincts which most of them manifest, cannot fail to call forth our admiration, gratitude, and praise to that wonder working hand "whose tender mercies are over all his works, and whose loving kindness is extended to every part of his creation."

The usual monthly meeting of the Stirling Natural History and Archaeological Society was held in the Smith Institute on Thursday, 7th June, Mr Croall in the chair. After minutes of former meeting had been read by the Secretary and approved of, the names of Miss Murray, Victoria Place, and Miss Lawson, Irvine Place, were submitted as associates, and Mr Meiklejohn, Melville Terrace, was declared elected a member of the society. Mr Cook moved that in view of the forth-

coming visit, on the 23rd inst., of the Geological Societies of Glasgow and Edinburgh to Stirling and Craigforth, it be remitted to a committee to appoint certain members from each section of the Stirling Natural History Society to meet these gentlemen and show them the places of interest in the locality, and that Mr Croall should have the principal exhibits in the Smith Institute at his disposal displayed on the occasion. This was agreed to. Mr Shearer then read a paper on "John Cowane's Chest," detailing the steps which he had taken to trace the relic, and to place its authenticity beyond a doubt. Several points in the letters which he had received while engaged in the work, and extracts from which Mr Shearer read, caused some discussion, particularly that regarding Cowane's coat of arms. A very exhaustive paper was read by Mr David Chrystal on "Scottish Ecclesiasticism at the time of the Union of the Crowns," with special reference to Stirling. A cordial vote of thanks was, on the motion of Rev. Mr Thomson, passed to Mr Chrystal for his very able paper. Notes on the excursion to Aberfoyle on the Queen's Birthday, by the Chairman, were held to be read. This concluded the business. Certain monstrosities of the vegetable world, in the form of dandelions with branched stems, were placed on the table for exhibition.

JOHN COWANE'S CHEST.

(By Dean of Guild Shearer.)

On the 3d October, 1882, I read a paper to the Field Club on the old oak chest of John Cowane. The paper appeared in our local newspapers, and was copied into others. The old chest has caused a considerable amount of interest to the "Sons of the Rock," and also to others residing at a distance. The chest has been in the Smith Institute for some time, and has been seen by many, and several of our county families have called and inspected it. I have heard of little adverse criticism as to the genuine character of the old chest. I specially sent it to the Water-Colour Gallery of the Institute in order that all might see it, as I am most anxious to put beyond a doubt if possible the genuine nature of the coffer, both on my own account and for the credit of our local newspapers, which accepted the chest as a genuine piece of old Scotch workmanship of the 17th century. I can assure you I have used every effort to trace its history, and will now lay before you the results of my research.

I may say, in the beginning, that the Messrs M'Tear of Glasgow, to whom the valuable consignment of old oak furniture was made, kindly promised to aid me as far as they were able, and at once gave me the name of the gentleman to whom it belonged. I have had several letters from Messrs M'Tear, and the Stirling papers containing the account of the chest, and my paper on the same, were duly sent to them, in order, if possible, to trace the matter to a successful end. On the 3d October, 1882, Mr M'Tear wrote me, giving me the name and address of the gentleman who consigned to his firm the old oak furniture from Yorkshire. I wrote to the party one or two letters, and daily expected an answer, and could not account for the long delay. Meanwhile I was making enquiries through other channels. However, on the 13th November, 1882, I was delighted to receive the following letter from Yorkshire :— .

DEAR SIR,—You will no doubt have been surprised that I have not replied to your favour before now. The reason has been that I have been ill, and had to go away to a watering-place, having been away about 5 weeks, but have now returned, and find your letter of 25th ult. awaiting me. As my letters have not been forwarded after me, I having left instructions that they were not to do so, I was from home when your previous letter came. On my return was taken ill, so did not attend to it. Previous to your writing, Mr M'Tear had asked me to kindly get all particulars I could, so I wrote to the son of the person I bought it from, and I find his reply has come to hand. I will forward you a copy by to-morrow's post.—Yours truly, G. R.

15th Nov.—Thanks for the very beautiful and clear photograph received. If any other notes should be published about the Chest of John Cowane, I should be very happy to receive copies. Do you know what the armorial bearings of the Cowanes' were? If they had any, I should like to have them.—G. R.

Nottingham, 23d October, 1882.

DEAR SIR,—I have left Newark for good, having been away for some time, and am just about to try and settle in America. I went over to bid my friends goodbye, and found your letter of September 29th lying at my cousin's, who had taken it in. With reference to the old chest that you purchased from my dear mother, along with all the other old oak furniture that my father had collected, all that I know about it is as follows :—"It has been in our old house ever since I remember, and we always alluded to it as the Stirling Chest. I have heard father say that once, when travelling in Scotland (I should think it will now be 40 years ago), he put up at an old Inn (I think they called the place Doone), and in going into the stable noticed an old chest, and was struck with some of the quaint inscriptions that were visible, but it was in a very filthy state at that time, and only part could be seen. He bought it for a trifle, and had it sent home; afterwards he got some one to properly clean and repair it. Beyond this I do not know, and I should scarcely think that the same people are living at the public-house now. Thanking you for the liberal way in

which you treated us in our misfortune, believe me to remain yours truly,—G. R. B.

This letter gives the history of the chest for half-a-century, and brings us back for enquiries to Doune. I have put myself in communication with one of the oldest inhabitants of Doune, who has gone heartily into the matter, and is able to give the names of the innkeepers of Doune for upwards of half-a-century. Meanwhile I have written to Yorkshire to learn if possible the year that the chest was purchased in Doune, and if successful I may find out some of the family yet alive. I may say I went to Doune and called on Mr James Cumming, who is well acquainted with Doune and its traditions. I have seen a dram glass in which Prince Charles E. Stewart is said to have been presented with a glass of wine in 1745 at the Cross of Doune by Dr Allan Stuart, previous to the Highlanders passing south by the Fords of Frew over the river Forth. The glass was broken, the admirer of the Prince saying no other one would ever drink out of it. I have a letter from Mr James Cumming, dated 19th March, 1883, in which he says :—

"That John Gibson, who died in 1820, was most likely to have had the chest. The inn in Doune was in the family for many years. His connection with the old Castle Meal Mill, and the old inn makes this conclusion not at all unreasonable. There is another way that the chest may have come into John Gibson's hands. One of our village doctors from about 1780 to 1808 was the famous stage doctor, Dr James M'Gill. The doctor was a great traveller through the districts of Scotland, and carried large packages of goods and prepared medicines along with him in his caravan. He was a man of cultivated tastes, and it is quite possible that he may have seen the chest at Stirling or elsewhere on his travels, and acquired and used it as a travelling case for keeping goods. This is a mere theory in the case! This is, however, a fact, that Dr M'Gill owned a three-quarter acre feu, with stables on it, and that after his death John Gibson purchased this feu and stables, containing a lot of things that belonged to the old caravan. If John Gibson was the party who sold the chest to Mr B——, he may have got it there. I am obliged to you for mentioning the name of Dr Allan Stewart of 1745. It would appear that the Doune folk seem to be unable at present to carry the authentic history of their doctors farther back than Dr Petrie, who now seems to have been the successor of the Dr Allan Stewart of 1745. I have never lost sight of the old chest, when I have had a chance of making useful inquiries about it—have gone over a lot of the old folk, men and women, and am still keeping the subject carefully in view. I may state, however, that your own idea of the Highlanders in 1745 having carried the chest away from Stirling to Doune is the best I know in relation to the chest ever having come here, and this theory does not preclude Dr M'Gill from having subsequently acquired it."

The Highlanders had a battery in the Stirling

Church-yard in 1746, and the Guild Hall would be in their possession, and the chest might be used for ammunition or provender in their retreat. As a rule the Highlanders, in retreating, carried away as much as possible with them.

In 1745-46 a garrison under Mr Stewart of Balloch held Doune Castle for Prince Charles, the Chevalier. The prisoners taken at the Battle of Falkirk were taken to Doune Castle, John Home, the author of the old tragedy, "Douglas," being one of them. They made their escape by making their bed-clothes into ropes, and dropping from the window of their cell. MacGregor of Glengyle, in 1745, also held the Castle for Prince Charles.

To-show the interest felt in the old chest, I will read a few extracts from letters received. A "Son of the Rock," who takes a deep interest in all matters relating to Stirling, writes as follows :—

Liverpool, 21st October, 1882.

DEAR SIR,—Many thanks for your kindness in sending me a report of your paper on John Cowane's chest, which I read with great interest in the *Reporter*, which I also received from you. I am very much disposed to the opinion that the chest is a veritable relic of the olden time. It bears all the evidence of being a genuine coffer. The inscriptions are in the style, and selection in perfect agreement with those on the hospital buildings, and most likely from the same designer. I am well aware of the rage for relics of all kinds in these days, and have had some experience in exposing about half-a-dozen different watches said to have been presented to Burns by his brother plowmen, but when I came to notice dates of maker's name on the watches, and the time in which they were said to be presented to the poet, they were such clumsy attempts that any one conversant with the poet's history could easily detect them. I have had a number of snuff boxes also, with inscriptions, said to be by the poet, but, like Peter Pindar s razors, they were all made for sale. But in all these attempts to pander to Burns' relic collectors, you will understand that those who buy them are spread over the world, the greediest perhaps in America so that if one fish does not catch the hook another will, and the sale of one relic pays well, but an obscure history like John Cowane's is not known out of your local annals, and an oak chest would scarcely pay to manufacture a spurious relic. The chances are few and far between of finding a purchaser out of Stirling.—Yours, &c., J. G.

Liverpool, 31st October, 1882.

DEAR SIR,—Many thanks for the very beautiful photograph of John Cowane's Chest. It is just such a one as I had pictured in my own mind, and in keeping with similar specimens of antique oak furniture I have seen in old family mansions. It bears all the marks of being what it represents, a veritable relic of the olden time, and is in fine taste, as many of the oak carvings are. I am more impressed than ever with what I wrote to you in my previous letter about the manufacture of relics. I always find that, like Peter Pindar's razors, when they are made for sale, it is to meet a demand, but the makers of them are wise in their generation to select such popular names as are sure to find customers in various parts of the country, as well as beyond the seas.

We have no end of relics from Shakespeare's mulberry tree, or the oak from the rafters of York Minster, &c., and I have seen in France and Belgium as many bits of the true cross as would have hanged a dozen thieves. J. G.

Liverpool, 20th November, 1882.

DEAR SIR,—Thanks for your letter with extracts respecting the old oak chest. The letter from Mr B. is of importance in tracing it to the hotel (or old inn) stable at Doune. There is nothing very surprising in finding a clue to the chest in the stable at Doune, after what we knew of the "Stirling Heads," and other relics which have been recovered. Our forefathers placed a little value upon these things, and were as likely to utilise an old oak chest for a corn bin as a butter shop to use old manuscripts in wrapping round butter, which has been found out on more occasions than one. J. G.

An Edinburgh gentleman writes under date November 16, 1882:—

DEAR SIR,—I am glad to learn you are succeeding in tracing the history of the old chest. I have seen Mr J. W. Small, author of "Ancient Scottish Woodwork," and showed him the photograph. He was greatly pleased with it, and says there is little doubt of its genuineness. The style of the lettering, ornamentation, and the shape of the chest, are all true to the period it is said to belong to From the photograph he fancies there has been a piece of newer wood inserted where the lock is. There is generally a metal lock-plate on such wood chests, but of course it may have been many years since this was done. It is evidently of Scotch manufacture, and its history is most interesting.—Yours, &c., J. W. W.

Edinburgh, November 21.

DEAR SIR,—I was very glad to hear that you had at last got a history of Cowane's chest—at least so far as it accounts for being taken to England. You will now have to get hold of the oldest inhabitant in Deune, and try and account for its having been taken there. Most likely it has been stolen, or perhaps taken to Doune as a place of safety during some of the wars—1715 to 1745. Mr B.'s letter goes far, however, to prove its genuineness, and I hope you will succeed in finding out more about it still. J. W. W.

Edinburgh, 29th Nov., 1882.

DEAR SIR,—With reference to John Cowane's Chest, my brother and Mr Small, who are both members of the Society of Antiquaries, think it would be a most desirable thing to have the chest shown, and your history of it read at the next meeting of the society. Mr Small is an authority on old wood-work, and would read your paper before the society. The whole history is so uncommon, and it is just one of those interesting subjects the Antiquarians like to get a hold of. J. W. W.

Mr J. W. Small, F.S.A., above referred to, wrote the following reply to a letter from me:—

56, George Street, Edinburgh.

DEAR SIR,—I am in receipt of your note of yesterday regarding the old chest. I take a great interest in all old wood-work, and will be glad to give you my opinion regarding it. It would be well if you did not mind the trouble which it would entail upon you to send it through to Edinburgh for exhibition to the Society of Antiquarians. We are always glad to see such, and put them on record in our proceedings.

Edinburgh, April 21st, 1883.

DEAR SIR,—I have no doubt of the authenticity of John

Cowane's Chest and its date. In the South Kensington Museum I made a special study of the collection of old chests there, and also in a private collection in a gentleman's house in Lancaster. I have seen one in Edinburgh, and they all confirm my belief in John Cowane's Chest and its date. J. W. S.

I should add that Mr Small came to Stirling and carefully inspected the chest. Mr Small is a recognised authority on old Scotch furniture, and published a large illustrated volume on the same. He contemplates bringing out a second volume, and I have the following letter from him :—

Edinburgh, March 20, 1883.

DEAR SIR,—I am proposing publishing another volume on "Ancient Scottish Furniture." Would you allow me to illustrate your old chest in it?"

I, of course, had much pleasure in agreeing to his request, and have a proof of the plate as now shown. A page of letterpress will be added. It is a very strong proof—putting aside the other facts altogether—of the genuineness of the chest, that Mr Small considers it worthy of a place in his forthcoming work, a work of considerable size and value.

I have now laid before you what I have learned of the history of the chest. The strong point is the letter from the son of the purchaser of the chest in Doune more than half a century ago, a gentleman of character and position in the South, who had no interest in framing a story untrue. I find a difficulty in tracing the innkeeper's descendants, as he is dead many years ago, and they have all left the place. Another evidence is the letters from gentlemen well able to form a correct opinion as to the chest; and further, there is the fact, that Mr Small, F.S.A., architect, Edinburgh, one of the first authorities on ancient furniture, has accepted it as a genuine relic, and given it a place, as I have already said, in his forthcoming volume. I am most anxious to invite criticism and inspection, and place, if possible, beyond a doubt, that the chest is what the inscription bears on it, viz., that it is the gift of John Cowane, 1636. The *Stirling Journal* of 27th September, 1882, writes, "whatever the purposes to which it was put, we accept it as a genuine article. Its shape and style are undoubtedly of the dole order." It may have been that the chest was intended for a poor dole to wanderers and strangers. The *Stirling Observer*, 27th Sept., 1882, says, "There is no doubt of the genuineness of this relic. It may have been a charter chest for containing the muniments belonging to the Guildry." In the paper by Mr Cook on the Stirling Guildry Ring,

read hear on 5th April, 1883, I note the following: —Speaking of John Cowane, the auditors report on his accounts, and say that "John Cowane has delivered to his successor in office, the gild box with twa keys, ane gild kist with the auld wreats and evidents perteining to ye said gildrie, with the auld handsenzie [standard] and twa pinsells [pennous] ane great wey baak [bulk for standard weights], and ane irone elwand, and ane gild ring, set with sundrie cullors of stanes, the auld gift of the gildrie, the charter of King David, and ane great bunshe of wy wreats perteining to ye said gildrie." If all the articles mentioned here were in the chest, it must have been a chest of considerable size, not less, I think, than the one before us.

I should wish it to be well known that I court the fullest inquiry, and will be delighted that the truth should be brought out, whether favourable or adverse. The chest, I hope, will not again leave the City of the Rock, and it will be more and more valued as the years roll on. In conclusion, I hope Mr Cook will be induced to continue his researches in the old Guildry Records, and that the volume spoken of being published for some years, will have the hearty support of the Guildry and Corporations of Stirling.

[*Note.*—Only the initials of the writers are put to the letters, but the originals are with me for inspection by any one feeling an interest in the matter.]

SCOTTISH ECCLESIASTICISM AT THE TIME OF THE UNION OF THE CROWNS.

(By David Chrystal.)

The present paper must be looked on, as introductory to a subject requiring much study, not as the results of study. The object in view is to set before you, first of all the aspects of Presbyterianism in general at the time of the Union of the Crowns, and to make some special references to Stirling. Matters it must be remembered are looked at all through from the point of view of a presbyterian; but religious controversy will be eschewed. The events that led to the Reformation in England and Scotland were widely different. While not agreeing with Newman's deductions, few will hazard a denial of Newman's statement, that England never broke from the Church of Rome. Henry VIII. and not England did that. No doubt the means for and the cause of a Reformation were latent in England

when the "Good King Harry broke from the Pope of Rome," but Harry's divorce played a memorable part in accelerating the event. It is, however, not allowed by Episcopalians that this affected the thorough nature of the Reformation in England. In a letter which Charles I. addressed to Mr Alex. Henderson, the famous minister of Leuchars, the King says:—"Because Henry the Eighth's Reformation was not perfect, will it prove that of King Edward and Queen Elizabeth to be imperfect? I believe a new Mode and Figure must be found out to form a syllogism whereby to prove that. But, however, you are mistaken; for no man who truly understands the English Reformation will derive it from Henry VIII., for he only gave the occasion; it was his son who begun, and Queen Elizabeth who perfected it." To come to modern disputation, Bishop Wordsworth in his reply to the first series of the St Giles' Lectures, disputes the claim made by Scotchmen that in Scotland only was the Reformation the result of the action of the middle classes, for he says, in England it was due 'under young King Edward,' mainly to the influence of Archbishop Cranmer. These two statements, made by widely different men, at widely different times, are, however, but further proof that whereas in England, even in the more perfect Reformation of Elizabeth, royal influence was used, and royalty reformed religion, in Scotland the people effected of themselves, and in opposition to royalty, their Reformation. In this country there were no supremacy and uniformity disputes. In Scotland long before the actual Disruption took place there had been foreshadowings of the event. The early religious agitators, most of them came from England; and the first great Scotch anti-popery movement was that of the Lollards of Kyle. In the Roman Catholic Register of Glasgow for 1494, it is recorded that thirty of these Lollards were summoned before Archbishop Blacater. Thirty-four charges founded on their profession were preferred against them. In that profession most of the errors of Rome are set forth. Transubstantiation, consecration, image worship, adoration of the Eucharist, and saint worship, are all condemned. The XI. article is this—"That the unction of kings ceased at the coming of Christ," to which Knox,* adds the following note:—"And truly it was but late since kings were anointed, namely in Scotland; for Edgar

* History of the Reformation of Religion in Scotland by John Knox.

was the first anointed King in Scotland about the year 1100." This seems to point to some political-ecclesiastical dispute of the times. The archbishop dismissed the thirty, having admonished them to be content with the faith of the Church, and to beware of new doctrines. But the real struggle did not begin till 1527, when Patrick Hamilton was burned at St Andrews. Hamilton had in him the makings of a Reformer. His treatise, "Assertions and Determinations concerning the Law, the office of the same; concerning Faith and the true fruits thereof," is highly praised by John Knox, and is justly praised. It is marked by a great breadth and warmth of feeling and fervour, and some of the sentences are very fine. For instance:—"Faith cometh of the Word of God, Hope cometh of Faith, and Charity springeth of them both." The following is taken from Burnet's Abridged History of the Reformation in England:—"Patrick Hamilton, nobly born, nephew by his father to the Earl of Aran, and to the Duke of Albany by his mother, was bred up on design to be highly preferred, and had an abbey given him for prosecuting his studies. He went to travel, and in Germany grew acquainted with Luther and Melancthon, and being possessed with their opinions, he returned to Scotland, and laid open the errors and corruptions then received in the Church. He was invited to St Andrews, to confer concerning these points, upon which he was condemned and put to prison. Articles were objected to him, and upon his refusing to adjure them, Beaton, Archbishop of St Andrews, with the Archbishop of Glasgow, three bishops, and five abbots, condemn'd him as an obstinate heretick, and delivered him to the secular power, and ordered the execution to be that afternoon; for the king had gone in pilgrimage to Ross; and they were afraid lest, upon his return, Hamilton's friends might have interceded effectually for him. He was tied to the stake, and expressed great joy in his sufferings, since by these he was to enter into everlasting life. A train of powder being fired, it did not kindle the fewel, but only burnt his face: so a stop was made till more powder was brought, and in that time the friars called oft to him to recant, and pray to the Virgin, and to say the *Salve Regina*. One friar, Campbel, was very officious among the rest, who had been oft with him in prison. He answered him that he was not an heretick, and had confessed it to him in private; and he charged him to answer for that to God. By this time the gun-

powder was brought, and the fire was kindled, and he died, oft repeating these words, — 'Lord Jesus, receive my soul.' Campbel became soon after frantic and died within a year." This was truly the beginning of the Reformation in Scotland. Men now began to look into religious matters for themselves. They had been born and brought up under a system which they were told was divine; and they were not permitted to enquire into its divinity for themselves. Printing, however, killed priestcraft. Men began to demand the truth. They could not get it from their priests. Then they sought it for themselves. The result was the Reformation. The next great light who suffered at the hands of the most perfect human institution, to quote Macaulay, which ever existed, was George Wishart. It is unnecessary here to speak of his life and death, but something may be not inappropriately said of his tenets. At his trial at St Andrews eighteen articles were charged against him. The first begins "Thou false heretic, runagate, traitor, and thief, deceiver of the people, despisest the Church." This is the beautiful and maternal language employed by the mother church to her erring child. The articles are sometimes amusing, witness the second, —"Thou false heretic did say, That a priest standing at the altar saying mass was like a fox wagging his tail in July." But Wishart denied the accusation. In the remaining articles he is *inter alia* accused of denying that there were seven sacraments; of condemning auricular confession; of saying openly that it was necessary for every man to know and understand his baptism, which, add the accusers, is contrary to General Councils and the state of the Holy Church; of denying that the mass was a sacrifice in any sense; of denying that extreme unction was a sacrament; of mocking at the efficacy of holy water; and of affirming that all men are priests. To these charges he returned various answers full of truth and life. These examples of the beliefs of the early reformers have been cited only to show how thorough and radical were the changes which they desired to be effected in the Church. The fire kindled at the stake where Hamilton suffered, and fanned by the murder of Wishart, did not die out. It smouldered on and on, gathering with time strength, and at last the flames burst forth. It is foreign to the purpose in view, and would be an insult to this Society to enter with any degree of minuteness into the life of John Knox. Born at Haddington, he became in time a

Romish priest, but, having been so for eleven years, he, fully convinced of the evil of the system, left the Church. You all know how he was imprisoned in St Andrews Castle, how he wrought as a galley slave; how he went to England, and there rose so high as to assist at the framing of the liturgy of Edward VI.; how thereafter he went to Geneva, on the constitution of whose kirk he afterwards partially framed the Scottish Church; and finally, how, in 1559, he returned to Scotland. The confession of faith drawn up by Knox and other clergy was in the same year of 1559 submitted to the Parliament. Any of you who wish to trace the history of the Reformation in Scotland from Parliamentary records can easily do so. The whole of the transactions of Scotch Parliaments and Councils from the first known to be held up till the Union of Parliaments were edited by the late Mr Cosmo Innes, and the volumes are in the Macfarlane Library. The Confession of Faith of 1560, is entirely different from that of the Westminster divines. The reason is obvious to all who have even glanced at the history of the Scottish Church. In the first place, there was a broader spirit prevading the kirk of 1560, than that which animated the assembly at Westminster. At that time an attempt, which cost more than it was worth, was made to conjoin the Presbyterian Churches in England and Scotland. There was a factor of Puritanism in the attempt, which was beneficially absent in 1560. It is not, however, for controversy that this is stated. The object is to show why the confession of 1560 was abandoned,—not because it was wrong, but only because the Puritans would not agree to it. Calvinistic theology prevades the confession, which, adopting the customary usage, will throughout this paper be termed Knox's. Adhering to the statement made at the beginning, nothing of its doctrines will be controversially alluded to. For elucidation, however, some reference must be made to them. Under the eighteenth head "of the notes by which the true church is decerned from the false, and who shall be judge of the doctrine," the following passage occurs:—"The notes . . . . . of the true Church of God, we believe, confess, and avow to be, *First*, the true preaching of the Word of God, in which God hath revealed Himself to us, as the writings of the prophets and apostles do declare; *Secondly*, the right administration of the sacraments of Christ Jesus, which may be annexed to the Word and promise of God to seal and confirm the same in

our hearts; *Lastly*, Ecclesiastical discipline uprightly ministered, as God's Word prescribeth, whereby vice is repressed and virtue nourished." On this description of an ideal church, a sketch of the constitution of the early Reformed Scotch Kirk will be based. With our Zwinglian tendencies, we may listen to the doctrine of the Eucharist, as also to his conception of baptism, inculcated by Knox. (Article xxi.) "We utterly condemn the vanity of those that affirm sacraments to be nothing else but naked and bare signs; no, we assuredly believe that by baptism we are engrafted into Jesus Christ, to be made partakers of His justice, by the which our sins are covered and remitted, and also, that in the supper, rightly used, Jesus Christ is so joined with us that He becometh the very nourishment and food of our souls." Such are the doctrines of the sacraments of the Church of the Reformation. The following is a sketch of its constitution. First, however, it may be well to give an account of the sources of information available for this, and at the same time to make one or two explanations. The guide to the study of the constitution of the Reformed Church, as everyone knows, is the Books of Discipline—the first of which was ratified by the Lords of Secret Council in 1560, the latter at various times approved of by General Assemblies, but never by Parliament. Round this central light of information, several smaller lights are congregated, and the best way to test the accuracy of the current descriptions of the reformed system, is to observe the working out of its details as shown in local registers, &c. The Books of Discipline were composed at different times, and are the handiwork of different men. But as the one did not (and was not intended to) supersede the other, their provisions have been looked at as both equally binding, which they undoubtedly were at the time we speak of. One word of explanation (before entering on an account of the office-bearers, the worship, and the discipline of the Church) in regard to its political position towards the close of the sixteenth century may be here inserted. Even before John Knox's death, the bishops were restored; but they were only so in name. They were stripped of all their power, and the only remains of their former greatness in 1571 was that they drew two-thirds of their former revenues. They had no weight in respect of their office in the Reformed Church. Even after, however, the Reformation was accomplished, by the law of Scotland, as it then stood, only bishops and abbots could

draw the revenues of the church lands. All that the Reformed clergy could claim were the teinds or tithes. Accordingly, in 1572, an arrangement was come to, at Leith, by which bishops and abbots were, with restricted powers, restored, but were made fully subject to the discipline of the General Assembly of the Church. A curious case illustrating the effects of this may be quoted from the Stirling Kirk Session Register of 6th July, 1614. It is this:—"The quhilk day John Williamsoun, Town Clerk of Stirling, by his awin proper confession, is becum obleist as cautionar and souertie for John Erskyne of Litill Sauchie, that he sall satisfie the Kirk of Stirling for sclandir called by fornicatioun committed be him with Margaret Erskyne, dochtor of umquhile Adame, Commendator of Cambuskynneth, and also the Civill Magistrat of the said Burgh." Evidently Adame, Commendator at Cambuskynneth, whose name often appears in the Parliamentary Records of James VI. reign, had become Protestant, and, being Protestant, had married a wife, all the time retaining the office, and receiving the emoluments he had held before the overthrow of the Roman Church. This mixing up of Episcopal and Roman *titles* with Presbyterian *polity* has led, in the past, to much confusion.

When Melville returned to Scotland he recognised the danger of all this, and rested not until, in 1578, the General Assembly, meeting at Stirling on the eleventh day of July, required all bishops already elected to submit themselves to the General Assembly concerning the Reformation of those Estates; which submission the Bishop of Dunblane willingly offered to the Assembly. In 1580, at the Dundee Assembly, matters were yet more plainly put:—"Forasmuch as the office of a bishop, as it is now used and commonly taken in this realm, hath no sure warrant, authority, nor good ground out of the Scriptures, but is brought in by folly and corruptions of men's inventions to the great overthrow of the Kirk of God, the whole Assembly . . . . finds and declares the same pretended office, used and termed as is above said, unlawful in itself, as having neither foundation, ground, or warrant in the Word of God." To this deliverance the Bishop of Dunblane also submitted. All this was again overturned in 1584, the year of the passing of the Black Acts, among which was one titled, "Ane Act Establishing the form of Jugement anent the Depositien and deprivation of ministers and uthers, beneficit personis fra thair benefices for

worthy cause;" which put the whole matter of deprivation into the hands of the bishops. The other most obnoxious Act was that ratifying the authority of the three Estates. This was of course very damaging to the Presbyterian cause, and for some years thereafter matters remained in a mixed condition—Presbyterian and Episcopalian clergy often serving in the same church, the Presbyterian clergyman officiating in the morning, the Episcopalian in the afternoon. They all, however, acknowledged the authority of the Books of Discipline; at least no attempt was made to get rid of them. After a lapse of three years (in 1587), an Act was passed annexing the temporalities of the benefices to the crown, which filled Presbyterian hearts with joy, at the time, making as it did the continuation of the Episcopal system well nigh impossible. Soon after this the tide turned, and in 1592, Parliament passed an act, to this day the legal charter of the Church of Scotland, (and which split the kirk in 1843), ratifying the liberty of the kirk, and dealing with the assemblies (general and synodal), presbyteries, and discipline, abolishing the Black Acts, and regulating the presentation to benefices. This act has never been removed from the statute book. Here we may end our account, as it is not necessary for our purpose to enter into the history of how this power, thus conferred, was sadly misused, and declined gradually, till Episcopacy became in 1634 the established religion of the country.

THE CONSTITUTION OF THE KIRK—ITS OFFICE-BEARERS.

At the head of the Reformed Scottish Church were the superintendents. With the establishment of presbyteries, unknown things till long after 1560, unrecognized indeed even at the time of the framing of the Second Book of Discipline, came the extinction of these functionaries. At one time it was contended that these superintendents were really bishops "in a modified sense." Were it to be added to this in the sense of the first and second centuries, the argument would have some plausibility. If, on the other hand, the word bishop be held to include all the functions of the present day-office, then the following declaration of Mr John Spottiswoode at his ordination, as superintendent of the Lothians (which diocese included Stirling), March 9th, 1560, is fatal to it. "I acknowledge myself a man, subject to infirmity, and one that hath need of correction and

admonition, and therefore I most willingly subject myself to the wholesome discipline of the Church, yea, to the discipline of the same Church of which I am now called to this office and charge; and here, in God's presence, and yours, do promise obedience to all admonitions, secretly and publicly given; unto which, if I am found disobedient, I confess myself most worthy to be rejected, not only from this honour, but also from the society of the faithful, in case of my stubbornness. For the vocation of God to bear charge within his Church, maketh not men tyrants, nor lords, but appointeth them servants, watchmen, and pastors to the flock." Every superintendent had to make this declaration, part of "The form and order of the election of the superintendents, and all other ministers, at Edinburgh, March 9th, 1560. John Knox being then preacher." It seems then that the office of a superintendent was only a gradation of that of the pastor, not a separate office. They were not a higher order of clergy, that is clear; they had no special immunities, and were subject to the ordinary discipline of the Church. One proof of the distinction between bishops and superintendents, extraneous from those supplied in the Books of Discipline, may be mentioned. After the Regent Morton in 1571 restored the title of bishop, and filled the sees with Tulchan Bishops, at various conventions, clerical representatives were present, and these were distinguished by their titles. There were superintendents and bishops. It follows then, that even after the restoration of the so-called bishops, the superintendents remained. There was no attempt to amalgamate the offices. In their very essence they were distinct.

John Knox wished twelve superintendents appointed, but at no time did more than six hold office. They had no easy time of it these superintendents. Like the evangelists of old, their province was to plant churches where there were none. They had to pass through their whole bounds at any rate twice in the year; not remaining in their chief town for more than four months at a time, unless compelled by sickness; thrice a week had they to preach (no information is given, though as to whether old sermons were allowed); they had a large discretionary power over the pastors; they had to note all lapsing into error; and lastly, they could be deposed at any time "without respect of person or office" for negligence, or for the same faults as an ordinary pastor. There is nothing here

to betoken a higher rank of clergy; there is only increased responsibility. Perhaps the Church has suffered from the loss of these superintendents. Now-a-days the lack of centralization is felt, and we cannot plead the practice of the early Church in this instance with success, for in it there was oneness in everything. To-day we are far from even agreeing to differ.

While speaking of this subject, it may be noted that in the second Book of Discipline, the word "Bishop" is introduced; but this only to bear out a three-fold description of the pastor—"sometimes they are called pastors, because they feed their congregations; sometimes *episcopi* or bishops because they watch over their flocks; sometimes ministers by reason of their service and office." After the superintendents came the pastors. Whenever the immediate pressure of the Reformation was got over, no time was lost by the kirk in clearly defining the necessity of ordination. In the third chapter of the second Book of Discipline (a much more high church document than the first) the following occurs:—"Ordination is the separation and sanctifying of the person appointed to God and his kirk, after he is well tried and found qualified. The ceremonies of ordination are fasting, earnest prayer, and imposition of hands of the eldership." It is, however, a noteworthy fact that all office-bearers were so to be ordained, not pastors only, but elders, deacons, and doctors. There was no sacerdotalism in the Church of the Reformation. But of necessity there were some things which the minister alone could do, and which he alone can do to this day. For instance, he had the "power of the keys" and could bind and loose (excommunicate and restore), but only after "the lawful proceedings of the eldership." Of the doctors, it may be remarked that they represented the revival of the office of catechist, an office which in the early days of the Church was filled by men of the stamp of Origen. In speaking of the office of elders, the most noticeable point is the great difference on this subject between the first and the second Books of Discipline. John Knox and his compeers say—"The election of elders and deacons ought to be used every year once . . . . lest of long continuance of such officers, men presume upon the liberty of the kirk. It hurteth not that one be received in office more years than one, so that he be appointed yearly by common and preconsent." In the second book, Andrew Melville, the staunchest of presbyters, and

his colleagues, whom no episcopal bait could lure—take a more high church—if the word may be used—view of the dignity of the eldership. As before noted, it is in the second Book of Discipline that ordination is so strongly insisted on, in the case of elders as well as ministers. So the following words are not surprising:—"Elders once lawfully called to office, and having gifts from God, meet to exercise the same, must not leave it again. Albeit such a number of elders may be chosen in certain congregations, and one part of them may relieve another for a reasonable time, as was among the Levites under the Law, in serving in the temple." Thus, the difference between the dogma of the Reformers, and the doctrine of the Reformed, is clearly set forth, but all in uniformity with the spirit which caused the former to make in the preface of their Confession of Faith that noble appeal for correction, and for admonition "of gentleness, and for Christian charity's sake," to all the brethren. It is this spirit of humility and *desire* for perfection, which has enabled the Church to battle successfully against so many adversaries, and out of all attempts to rob her of her Presbyterianism, to rise triumphant. The teaching of the first Book of Discipline on the eldership question, was that generally followed. An example will be found at the end of the paper. The deacon's office is clearly defined. They are to act as treasurers, and distribute the funds of the Church to the poor. The poor were much minded in these days, and in our own town they were treated with much and true consideration. We find in the Kirk Session Records of 9th March, 1619, the following:—"The present Assemblie understanding thair is ane great nummer of honest indigent personis within this congregatione, that levis varie hardlie thruch want of their necessaris, and yet ar ashamit to mein thir esteat publicklie as utheris dois, and seing Chiritie requris that thay sould be cheeflie respectit, and nawayes neglectit of thair portione of the puiris almis collectit to that effect. Thairfoir, the haill assemblie present, with ane consent, hes concluded and appointed thair brethrein of the kirk underwritten (here follow the names) as personis that best knawis the esteat of this toun, to tak ane privie and exact tryell of the namis of all sic persones as are above specifeit within this toun, and to rall thame; and after deliberat adysement, to appoynt quhow everie ane of thame sal be supported according to thair present esteat and necessitie." According to the second

Supper may be ministrat with the greater reverence, therefore the brethrein of the kirk desyris the thesaurar and maister of wark to attend that the windois of the queire be clois at all tymes, and specialle at the tyme of the ministratione of the Sacrament, in sic sort that na foull have any interes within the queire." Marriage was, according to the First Book of Discipline, to be solemnized on Sundays, before noon, and it was to be used on no day else without the consent of the whole ministry. This rule was, however, not long observed. The kirk appears to have had great difficulty in dealing with this important subject. In Stirling a large number of acts of Council, and by the Session were enacted concerning it. On 1st December, 1609, one was approved of by the Session, after passing the Council. Its provisions briefly are, that all persons proclaimed in the Parish Kirk of the Burgh, and residing therein, will be liable to forfeit twenty pounds, should they marry outside the Burgh; but a man marrying an "outland" woman, may leave the Burgh, but "it is statut and ordaint that it shall noct be lessom to him to desyr any ma persones nychbouris of this burgh nor twenty persons;" an "outland" man had to come into the Burgh to be yoked to an "indwellin" woman; and the Session ordains that "no testamoniall be gevin bot according thairto in all pointes." These rules are very stringent, and must have caused lovers many anxious thoughts. A fine for getting married out of your native town would prove to-day a lucrative source of income to the exchequer. The doctrine of the Church in regard to baptism has already been explained. Its position in public worship was as follows. The administration of the Sacrament was not confined to any particular day, but Sunday is recommended as that most suitable; or at least "Upon the day of prayers only after the sermon." This was ordained partly to remove "the gross error" of supposing that baptism is needed for infant salvation, and also to make the people have a greater reverence for the solemnity of the Sacrament.

THE DISCIPLINE OF THE CHURCH.

Under the head of "persons subject to discipline," in the First Book of Discipline it is set forth "To discipline must all the estates within this realm be subject, as well the rulers as they that are ruled; yea, and the preachers themselves, as well as the poor within the kirk; and because the eye and

mouth of the kirk ought to be most single and irreprehensible, the life and conversation of the minister ought to be diligently tried." The reformers were indeed no respecters of persons. They desired a pure ministry. Above all it was expedient that the superintendents, the heads of the dioceses, should be men of good report. "After the kirk is established, and three years be passed, we require that no man be called to the office of superintendent, who hath not at least two years given declaration of the faithful labours in the ministry of the same kirk." The article on Ecclesiastical Discipline begins by showing the need for it; how in times past Popery had corrupted the meaning of the term, and how it behoved the Church to draw the sword, given it by God against all sin. The process of punishment is slow. At first the offender suspected of an offence is privately admonished. If he has openly transgressed he is summoned before the session and is publicly rebuked. Should he show signs of true penitence "then the kirk may and ought to receive him as a penitent;" but though he continues even yet hardened unto sin, he is not separated from the kirk, but is dimitted with an exhortation, to consider the dangerous estate in which he stands. Even now, being repentant, he is to be received back into the arms of the church, but if he show no sign of sorrow the whole interest of the congregation becomes centered in him. The Book of Discipline continues:—"If a solemn and special prayer were drawn for that purpose, the thing should be more gravely done. The third Sunday the minister ought to require, if the impenitent hath declared any signs of repentance to any of the ministry; and if he hath, then may the minister appoint him to be examined by the whole ministry, either then instantly or another day affixed to the consistory; and if repentance appear, as well for his crime as for his long contempt, then he may be presented to the kirk, and make his confession to be accepted as afore is said; but if no man signify his repentance, then ought he to be excommunicated, and by the mouth of the minister, and consent of the ministry, and commandment of the kirk, must such a contemner be pronounced excommunicate from God, and from all society of the kirk." The effects of this sentence of excommunication, which was to be published throughout the realm, were fearfully—the word is a good one—severe. Children born after such a sentence were not to be baptized, except the mother, and some special

friend, abhoring and condemning the offence, present the child. Literally the man was "boycotted." No one, save his family, were to speak to him, buy from or sell to him, even eat with him. Thus far, Tertullian, in his later days, would have approved of the Scotch kirk. But he would not have approved of its clemency in allowing the excommunicated man or woman, after sincere contrition and searching examination, to be restored. Time does not permit of a description of the restoration; a most striking ceremony, following closely on the lines and practice of the early Christian Church. It was seldom that the sentence of excommunication was pronounced, the offenders generally submitting at the first summons before the session. The Reformers have been charged by those outside the Presbyterian Church of being far too severe in their discipline. Those who condemn would do well to study the Commination Service of the Church of England, which sets forth that the restoration of public confession of offenders is ardently to be desired. The Reformers, as has been said, were no respectors of persons. In the General Assemblies, the superintendents were dealt with quite as rigourously, indeed, more so, than were the breakers of the Sabbath, in the Kirk Sessions. In December, 1567, we find the Assembly dealing with a distinguished offender, "Adam, called Bishop of Orkney, and commissioner, was accused. That he being bishop and commissioner, occupied the room of a magistrate in the session, his sheep wandering without a pastor, and retains in his company Sir James Bothwel, a rank Papist, to whom he hath given benefices, and placed him as minister in those kirks, as also that he soleminzed the marriage of the Queen and the Earl of Bothwel, &c., and for the said causes was deprived." On the same day the "Bishop of Galloway was brought up, charged with having failed to visit his charge for three years." To come to later, humbler, and local offenders. In reference to an extract given before, the following may be noted:—"May 25, 1611. Johne Lindsay, being accused for breking of the ordour of the toun, quha has mareit ane woman parochinar in this toun, be making of his brydell without this toun; he confessit the samin, and therefor it is fund that he is in the tounis will of xx lib., quhilk thay will uplift fra him except he be his good behaveour in the toun procure thair favor tharintul." Some explanation might be given of the following:—"May 28, 1601. Andro Liddall.

—Anent the complint producit be Johne Kirkwood, contrar, Andro Liddall, tailyur, for abusing the giftis of God in geving the said Johnne, seallit maister, to drink, lating him to understand the samin was drinking beir, be quhais perswasione the said John wes movit to drink the said maister as at more length is continit in the said complent. Compeirit the said Andro personalie; with the quhilk the brethrein being advysit, they find the said Andro Liddall has gevin to the sayd John Kirkwood, steallit maister, to drink, &c., and for removing the sclander thereof, he is ordinit to mak publicit repentance the nixt Sonday in secclayth, and by auctoritie of the civill Magistrat heir present, he is ordained to pay *ad pios usus* vjlb xiijs iiijd, &c." The following entry has reference to a point before referred to regarding the eldership:— "Dec. 25, 1627. The quhilk day the breatherein ordeanes the officer to warne the eldars against Sonday nixt, to sitt in the Merchands loft, and thair to hold up thair hands befoir the congregationne in signe and token of thair fidelitie in the said office of the eldarship for ane yeir to come."

Before concluding, one word may be said regarding Knox's scheme of education. It certainly is as grand a one as man ever conceived. In perfect harmony with the teaching of the Early Christian Church, that all things done on earth are religious acts, the system develops the theory of making religion the centre of all study and knowledge. The doctors were officers of the Church, and, seemingly, were to be ordained. The whole system of education was to be wedded to the Church, not subserviently, but in a manly and Christian spirit. All things are arranged. The course of study is definitely set forth, from the grammar school to the University. The universities were to be "doted with temporal lands," and all the salaries of the officials were fixed. Every principal of the three colleges was to have £200 per annum; certainly not large remuneration. At a future date we shall attempt to give a full account of this system. It has thus been endeavoured to outline the constitution of the early Reformed Scotch Church under those divisions, its office-bearers, its worship, and its discipline by which, according to Knox's Confession, the true church is to be decerned. The structure is one different, a great deal, from that which exists in this land to-day. We have lost our confession, our superintendents, and our prayer book, and now-a-days, political economists say that

secular and religious instruction should be severed. We have progressed in much, but some of our so-called progression has only been change, and not always change for the better. It would seem that to-day, far more than at the close of the sixteenth century, is the prospect of a broad catholicity of spirit, which should embrace all creeds, and have room for all trifling differences, visionary and shadowy. We have gone on refining and pruning till an eminent Scotch divine exclaims "the worship of the Scotch Church might be reconciled to the English, but its polity never." Is there something divinely wrong in the one and divinely right in the other? Can we not agree to differ, and, settling down, try to gain for the Church, a thing far more important than uniformity of worship, the active and intelligent support of those whom we call the "lapsed masses."

The monthly meeting of the above society was held in the Smith Institute on the evening of Thursday the 6th inst.—Mr Croall in the chair. There was a very small attendance. The minutes of last (June) meeting having been read and approved of, the secretary read minute of meeting of Council of 5th inst., regarding the arrangements between the Macfarlane Free Library Trustees and the society. It appeared that the trustees were willing to hand over all the property in the shape of a museum, presently in their custody, to the Stirling Natural History and Archæological Society, provided the society agreed to provide suitable accommodation for the same, and to abrogate all right of sale or disposal without the Trustees' consent. The council had passed a resolution agreeing to the above terms, and the meeting approved of the same. It was stated that the resolution did not bind the society to raise any specified sum, and that the only responsibility they incurred in the matter was to be the medium for the collection of the amount required. The council had also agreed to apply, along with four other towns in the district, for the "Gilchrist Lectures" for the winter of 1884-5, and the meeting approved thereof. Papers were read by Mr Moyes and Mr Croall on the joint excursion of the Edinburgh and Glasgow Geological Societies to Stirling, and on various private excursions made by members of the Natural History Society to places of interest in the district respectively. A vote of thanks to both gentlemen terminated the

proceedings. Beautifully mounted specimens of plants referred to in Mr Croall's paper were exhibited.

Several private excursions have already taken place during the present season, but the results were not sufficiently important to require notice. No new fact or new information of any importance having been obtained, the first that seems to require any notice was one to

ALVA AND MENSTRIE GLENS.

This, too, was a private excursion, and, as it happened, proved more interesting in a geological than in a botanical point of view. As we entered the glen, the first thing that attracted our attention was the patch of Geranium pratense now in full flower. This we had noticed before, but in looking more carefully at it than usual, we observed, scattered over the patch, considerable numbers of the *Alchemilla conjuncta*, a form of the Lady's Mantle, seldom seen in a wild state in this country, although frequently cultivated in gardens. It differs from the *alpina* in the segments of the leaves being united about half-way, their edges being beautifully ciliated with the white hairs that cover the back. The plant was reported from the Clova mountains many years ago by Don, but no botanist has since met with it until 1856, when I found two small patches of it there on the margin of a stream from the north side of Scorrie, a name given to the rugged cliffs that form the extremity of the barrier that separates Glen Fiadh from Glen Dole. Whether it was indigenous there or not, I cannot say, but it had all the appearance of it, and was not likely ever to have come there otherwise, unless by the hands of a botanist. In the present locality, however, I have no doubt of its being a garden-escape, having been most likely thrown out from the gardens along with rubbish. It was flowering freely, however, and is likely now to hold its ground. On entering the glen, Mr Taylor was at once struck with the peculiar character and position of the rocks. These consisted of alternate masses of volcanic Breccia and Porphyrite, standing nearly perpendicularly on each side of the glen, the lines of junction being readily made out. Proceeding upwards to Glen Whannel Burn, we then struck across the hills to Menstrie Glen, and in our way across Westhill, Balquharn Glen, and Myreton Hill, observed the same series of rocks every now and again cropping up as we proceeded, and although very little new botanically, was observed, as we had

traversed nearly the same route before, we had pleasure in collecting on the summit of West Hill, the moss Hypnum-fluitans in fruit, which is rather scarce, and even at this early season the pretty little fungus, *Agaricus rotula*. By the streams, the little Willow-herb *(Epilobium alsinifolium)*, was abundant, the smaller alpine form *(E. alpinum)*, less frequent, and in one spot also, Wilson's Filmy Fern *(Hymenophyllum Wilsoni.)* On crossing the West Hill, we observed the two Peregrine Falcons, wheeling their airy flight, so that they still seem to claim the cliffs in front as their lawful dwelling place, in defiance of all intruders. How long the same pair have done so, it would be interesting to know, but altogether beyond the power of human ken, I fear, to ascertain.

VISIT OF THE NATURAL HISTORY SOCITEY OF EDINBURGH.

A deputation from this society visited Stirling in the end of July, and although the visit was a short one, the party not only seemed greatly pleased with their success, but some doubts as to the identity of species were thereby cleared up, and errors in our local flora corrected. A plant, several patches of which grow near the Butt Well, but which had not hitherto been observed in flower, was pointed out to them as supposed to be a form of the Scotch Lovage. Mr Christie, to whom the plant was familiar, at once replied, no, not that—it is the Masterwort *(Peucedanum ostruthium)*, a much less common plant. Fortunately, on the present occasion, three of the plants were coming into flower, which was very satisfactory as well as gratifying to our friends. I had observed what appeared to be the same plant by the roadside, near the King's Yett on Touch moors, in the spring of 1879, with the young foliage and the withered fragments of last years flowering stems, and it now became a question of importance to decide, whether that was identical with the plant at the Butt Well, or whether it might still be rightly referred to the Scotch Lovage. To settle this point it would only be necessary to see it at the proper season, when flowers and fruit could be obtained. This, I considered, would be in the course of two or three weeks; at the end of that time I visited the locality, and was delighted to find it in perfection. Some 30 or 40 plants had been in flower, and several of the secondary branches were still in that state, whilst several of the heads of seeds were fully

formed; we have thus been enabled to settle the identity of this plant very satisfactorily, and to procure good specimens for our collection, and, I am glad to say, for the information of our members and others interested in our local Flora, that in the second locality above mentioned they can procure any amount of specimens at the given date, as it seems to flower there very freely.

DIFFERENCE OF THE TWO PLANTS.

The difference between the two plants is greater in reality than in the descriptions, which can hardly be said to be perfectly accurate, and as the two plants so nearly resemble each other in most of their characters, it would be as well perhaps to make their distinctive characters as clear as possible. In the Scotch Lovage the fruit is said to be ovate, with many *vittæ* between the ribs. The form we should rather say was oblong, and the *vittæ* are almost invariably *three*, and the tranverse section of the fruit is round. In the Masterwort, the fruit is very much compressed, and flat, with broad marginal wings, and the transverse section narrow, almost linear, a single *vitta* for the most part between the ridges. The partial involucres in both are nearly alike, but in the Masterwort the general involucre is entirely wanting, whilst in the Lovage, it consists of from two to six, mostly four, small narrow leaves. In the description of the leaves there is scarcely a shade of difference, in the plants themselves it is considerable. In the Lovage they are said *not* to be shining, in the fresh state, they certainly are so, more so, and also more fleshy than in the other. In both they are described as *biternate*, but in neither are they always perfectly so; in the Lovage frequently, in the Masterwort rarely. In the first, the leaflets are often stalked, in the second they are so very rarely, and the inner segment of the outer leaflet is often wanting, and the outer segment hardly separate halfway down, and is generally abbreviated at the base, thus making the base of the side leaflets unequal, the centre one being generally equal and more distinctly ternate. In the Lovage, the leaves are rather fleshy, in the other more membraneous. In the Lovage, the serratures of the leaves are mostly confined to the upper half, in the Masterwort they extend nearly to the base, and are rather unequal. On the bank, south side of the castle, a curious monstrosity of the wild Daisy was noticed by Mr Christie, without any petals.

THIRD EXCURSION, 24TH MAY, 1883.

From various causes, chiefly that of unfavourable weather, our excursions last year were all but total failures, and this year has made a fair and creditable commencement on the same lines. The first two of the present season entirely fell through from the same cause, and the third ended in disappointment from one altogether different. It was arranged for the Queen's birth-day, and the destination was Loch Leven, the island and castle being the principal object of attraction. By those acquainted with the place, we were assured that no difficulty could be experienced, as boats were always procurable. Our secretary, nevertheless, wrote for information, and only at ten o'clock on the previous evening a telegram arrived with the sad news that no boat to the island would possibly be obtained on the following day, as the competition of the National Angling Club was to be held. On calling on the intended excursionists next morning it was agreed to give up Loch Leven, and finally to go to Aberfoyle instead, and at 10.30 A.M. we started per Forth and Clyde for the country of the celebrated Rob Roy. We duly reached Aberfoyle by 12 o'clock, and began to consider what was to be done, and first as to our return. On enquiring, we learned that we had only the choice of two trains; one at 2.55, and another at 4.6, but by the latter we would have the advantage of two hours or more of a delay at Buchlyvie, so to avoid this we decided on returning by the first at 2.55. This only gave us three hours at Aberfoyle, a space of time which it would not be difficult to fill up in such a locality. At all events, we would not require to consider what was to be done first, so we decided, after expressing our disgust at there not being a later train, to walk up to Loch Ard and then return home. The prospect was sad indeed to have to traverse three miles of such interesting country, surrounded with such romantic scenery, only to look at it in the distance. On the one side were wooded knolls, sparkling brooks, with here and there a rustic cottage, an old mill, or a modern villa peeping through the foliage; on the other, rocky slopes, towering precipices, and dark shaded gorges, with, no doubt, murmuring waterfalls, fringed with festoons of moss and bright with alpine flowers. But these we could only fancy—dream of in the future; at present we had hardly time to catch a glimpse of those by the wayside as we hastened onwards. Leaving the Clachan for future investigation, we proceeded on our walk.

The blue limestone of the district, some coarse slate, and several varieties of trap, were the only rocks which we observed, but slate of superior quality is quarried on the brow of the hill behind the Clachan. Of plants we saw very few, and these by no means of great interest or rarity. The pretty little marsh violet *(Viola palustris)* was frequent in damp places by the wayside; and in several places the bog myrtle *(Myrica galle)* might be seen—and felt where it was not seen—"wasting its fragrance on the desert air," and displaying its minute cones in great abundance. The poet says "Gale from the bog shall waft Arabian balm," and it has often seemed to me wonderful why this pretty little shrub, possessing, as it does, such a rich and agreeable odour, has never found a place in our gardens; two fine young plants are now growing in my garden, and their rich perfume is only equalled by that of their next neighbour, the lavender cotton *(Santolina chamæ-cyparissus)*. The golden willow *(Salix aurita)* was also plentiful, though rare in the lower districts of the country. The primrose was plentiful in flower on banks by the wayside, and the dog violet *(Viola canina)*, with pale and dark coloured flowers, was also abundant; so also was the common valerian *(Valeriana officinalis)*, common marsh cinquefoil *(Comarum palustre)*, the juniper *(Juniperus communis)*, ivy *(Ilex aquifolia)*, broom *(Cityaus scoparius)*, furze *(Ulex Enropæus)*, and the honeysuckle *(Lonicera periclymenum)*, the common wild angelica *(Ang. sylvertris)*, the wood sorrel *(Oxalis acetocella)*, the beech fern and hay-scented fern *(Polypodium phegopteris* and *Lastrea Oreopteris)*, and many others, I have no doubt, had time permitted of our looking for them. We observed in the collections of some other tourists who had come by an earlier train, the globe-flower *(Trollius Europæus)*, the oak-fern *(Polypodium dryopteris)*, the beech-fern *(P. Phegopteris)*; and the royal fern, we were told, has become rare, though it was once found in plenty at the upper end of the Lake. In some, and perhaps in all the damp ravines and gullies, with which the mountains are scarred, Willson's filmy-fern, and likely not a few others, would be found in more or less plenty. In tne New Statistical Account a list of 20 names of plants are given; only seven of these are worth noting, however, and in the case of three others, only the *genus* is mentioned, and the botanist is left to wonder which of the species is intended, as no one in particular is indicated. We learn that

the lakes and streams are good hunting grounds for the angler, and we have no doubt but their shores would be equally interesting for the entomologist, as the great variety of wood and water, rock and mountain, must do all but render this "a happy valley" for the insect world; but for the present we had to bid them all adieu, and leave them to their enjoyment of their chosen paradise, and retrace our steps to the iron horse, which we found snorting out his warning that "time was up," and we had no more to lose, so we got up behind him and started for home, delighted with our short glimpse of the famous glen, and only sorry to leave it without getting better acquainted with its history and statistics.

At a later period an excursion was arranged to the rocky cliffs above Gargunnock, where we found the Starry Saxifrage *(Saxifraga stellaris)*, in some plenty, especially towards the west, and in a small wood with some remains of old Scotch firs, we found the little Chickweed-Wintergreen *(Pyrola minor)* in great abundance and in fine flower, hitherto it has been found only sparingly, and the flowers even more so.

JOINT EXCURSION OF THE EDINBURGH AND GLASGOW GEOLOGICAL SOCIETIES, WITH THE STIRLING NATURAL HISTORY AND ARCHÆOLOGICAL SOCIETY.

A most interesting and enjoyable excursion took place on the 23d June. The Geological Societies of Edinburgh and Glasgow, having resolved on a joint excursion to Stirling and its neighbourhood, communicated with our secretary in order to have the assistance and guidance, so far as it was needed, of the members of this Association. It was a bright genial day, and the result proved most successful, both as to the numbers present and the objects visited. The visitors—about a dozen from Glasgow and half that number from Edinburgh—were, on arrival, conducted to the Smith Institute, where they examined the geological collection belonging to the Association. Mr John Young of the Hunterian Museum, Glasgow, gave interesting information about many of the specimens—referring specially to the collection of fossil ferns, from Furnace Bank, near Sauchie—a few specimens showing the fern in fruit being particularly noticed. After these had been examined, Mr Young remarked that the Association had made a very good beginning with its geological collection, and offered to assist their future efforts in its extension. I may here notice

that most of the specimens in our cabinet have been collected and named by Mr Robert Kidston, who has now been admitted a Fellow of the Geological Society, a distinction he well merits. Having examined the local collection, the visitors gave some attention to the other exhibits in the museum, and many of them expressed surprise at the number of excellent specimens of minerals, &c., found in the different cases. There being now a full attendance of the members of our Association—over a dozen—it was agreed that the visitors should be conducted to the section of Carboniferous strata, underlying the Castle rock, a portion of which is exposed a little to the east of the Raploch. As the company left the Institute, Mr Jolly, H.M. Inspector of Schools, who is an enthusiastic geologist, and gave much valuable information throughout the day, mentioned that he had seen distinct traces of "Glacial Striation" on the outcrop of Trap at the entrance to the King's Park, near the farm. This was something new, even to local geologists, and it was agreed to visit the spot. The marks were easily found, and on a reference to the map, it was seen that their direction corresponded with the "lie" of the valley of the Teith. An examination of the 6-inch map of the geological survey showed that these glacial striae had either escaped the notice of the surveyor or had not been considered of sufficient interest to find a place in his record. The attention of the visitors was now directed to the "Boulders" in the park—two behind the King's Park Farm and three lying on the height. Mr Young said that they were probably of Silurian Schist, and had been carried by ice from the Ben Lomond district. A closer inspection showed this surmise to be correct. The largest of the boulders is, however, not so fine in the grain as the others, and some of the members were inclined to doubt its having the same origin as the smaller ones. Mr Young said there could be no doubt as to its being from the same district. It was explained that these schistose rocks were originally sedimentary, but had been much changed through the extreme heat to which they had been subjected, and all traces of organisms had been completely destroyed. It was noticed that an attempt had been made to blast the largest boulder, and the hope was expressed that the local association would take steps to prevent its destruction. A move was now made to the Castle rock. Crossing the King's Knot and passing along the lower Back Walk to a point on the other side of the road lead-

ing to the Raploch, a section of carboniferous strata was reached and carefully examined. It consists chiefly of a sandy shale, very much weathered, and is interesting from its relation to the Castle rock under which it dips at a considerable angle. The Raploch quarry was next visited. Here a seam of the Murrayshall limestone from 12 to 15 inches in thickness, was observed, and underlying it was a considerable section of the carboniferous sandstone. The sandstone is of a coarse description and mainly composed of quartz grains and decomposed felspar. The shale, in which many fossils were found some three years ago, was nearly all gone, and the debris so weathered that no traces of fossils were seen. The next object of interest was the junction of the trap and shale at a point behind the seat placed at the entrance to the Ballengeich. It was found that only a very small section was exposed, the debris of the trap which is crumbling down very rapidly at this point having covered up the greater portion of the section. Enough was seen to show that the shale had been completely changed by the heat of the overlying trap. Behind this section the spheroidal weathering of the dolerite was particularly noticeable. Dr Galbraith said, that when a boy at school he had often come to gather the burnt shale which was used as "caum" for slate-writing. The spot where he had been in the habit of gathering was, however, now quite covered with debris. Whilst searching for the burnt shale, a boulder of hornblende rock was discovered. To satisfy those of an antiquarian turn of mind a visit was paid to the Roman Stone. Having examined it and heard its story, so far as known, ably told by Dr Galbraith, a call was made on Mr John Young who proceeded to give a very interesting and instructive address on the geology of the district with special reference to the geologic periods represented by the hills within view. He explained that the great plain lying to the west formed part of the central basin in which the Old Red Sandstone deposits were laid down. To this central basin Professor Geikie has given the name of Lake Caledonia. On the further side of this there lie the Grampians, consisting for the most part of schistose rocks which, no doubt, were originally sedimentary but had assumed in various degrees a crystalline condition, and were in existence before the deposition of the Old Red Sandstone. Nearer were the Ochils which were of the same age as the Pentlands and the Sidlaw Hills, and were made up of porphyrite—lavas, felsites, and tuffs.

They belong to the lower Old Red Sandstone period, and point to the outburst of numerous volcanic vents along the lake or inland sea in which the lower Old Red Sandstone deposits of central Scotland were laid down, and their disposition shows that the vents ranged themselves in lines parallel with the general trend of the great central valley. To the left lay the Gargunnock and Touch hills, which were not so old as the Ochils, but were assigned to lower Carboniferous times. They consist of successive sheets of porphyrites and tuffs, and show that the early part of the Carboniferous period was marked by a prodigious volcanic activity. The Castle rock and Abbey Craig were examples of still later volcanic outbursts, and were most probably of the same age (Tertiary) as the basalt of the Giant's Causeway and Fingal's Cave. They were intrusive rocks, but in the long course of time that had elapsed since their eruption, the overlying strata had been denuded. There was no doubt, that a very great depth of strata had been removed in this way. At the conclusion of Mr Young's interesting address the company paid a visit to the "Heading-stone" which was found to be a close-grained schist still showing evidence of striation. The visitors had now exhausted the time at their disposal, and were obliged to return to town. It only remains for me to add that the visit of the Edinburgh and Glasgow Geological Societies was highly enjoyed by the members of our Association, and to express the hope that a joint excursion may be arranged at some future, but not distant date, to visit other places in this district worthy of the attention of working Geologists.

The annual meeting of the above society was held in the Smith Institute on the evening of Thursday the 4th Oct.—Mr Croall presiding. The minutes of former meeting having been read by the secretary, the following gentlemen were, on the recommendation of the council, appointed office-bearers for the ensuing year:—Presidents, Colonel Murray of Polmaise; Colonel Stirling of Gargunnock. Acting President, Mr Alex. Croall. Vice-Presidents, Mr J. A. Harvie-Brown, Rev. Wm. F. Goldie. Joint-Secretaries, Mr David Chrystal, Rev. J. E. H. Thomson. Treasurer, Mr Daniel Ferguson, National Bank. New Members of Executive, Dr Galbraith, Southfield; Mr John Walker, Garfield House; Dean of Guild Shearer.

Mr CROALL then read the President's annual report, which was as follows :—In laying before the members of the society the report for the past year, we shall endeavour to be as brief as possible. The first subject that seems to demand—although certainly not to invite—our attention is that of the excursions. These have not been so successful this season as could have been wished, partly perhaps owing to the weather and partly also to other causes over which we had equally little control. At the March meeting of the council it was suggested that, by way of change, the arrangement of the excursions might be left to the monthly meetings, the excursions in each month being intimated at the previous public meeting. It was then forgotten, however, that during the months of July and August there would be no public meeting, and consequently for these months, the most important in the season, no excursions were arranged, and none took place. As the weather seriously interfered with those previously arranged, it might not have been more favourable for those in July and August, but it might have been a better plan to have prearranged those at least for July and August when there were no meetings. Very few Saturdays, this season, have been favourable for excursions, either public or private, and private ones have been hardly more numerous or more successful than those intended for the members generally ; and indeed as far as the flora of the district is concerned very few additions can now be expected, but there are no doubt still a few, as has been shewn by the experience of the past two seasons. Some of the rarer plants, however, will no doubt be found to be more generally distributed than is yet supposed, and many new localities possibly still remain to be noted. It has also been suggested that these excursions might be made more useful if their object was more for the purpose of conveying information to those members who might be disposed to join them than of working up the local flora and obtaining more information relating to the distribution of species. The plan sometimes adopted of reading a paper on some subject connected with and illustrated by the geology, mineralogy, or botany, or to illustrate some department of the flora or fauna of the locality visited, might be interesting and instructive. On some occasions, at least, this might be advantageous, and it remains with the members to express their approval or otherwise of the plan. As we were unable to prepare a detailed list of additional species

last year the list for the last and present years will be subjoined, so as to complete the local flora up to the present time. Many of these are now arranged on the paper in the cabinet, and may be consulted at any time by the members or others, by applying to the curator, who will be happy to assist in their study or in the removal of doubts and difficulties in the determination of species or in explaining the relations of nearly allied forms. Some feeble attempts were last year made to surmount the difficulties in the study of the fungi or mushroom tribes. The extreme difficulty of preserving these plants so as to render them satisfactory to the collector, either as objects of beauty or to assist in the identification of the species, has always deterred me as well as many others from studying them. This season, however, we have been gradually drawn into the vortex, if not of studying, at all events, of preserving a considerable number of the species, more especially of the microscopic forms, many of which are exceedingly curious and interesting, particularly when examined by the microscope. The larger and perhaps more highly developed species are so evanescent and so subject to decomposition, that all attempts to preserve them in anything like their native beauty and attractiveness, has hitherto all but failed. Fortunately, however, the more minute species which are only visible to the naked eye in the aggregate, are, for the most part, less liable to decay, and their preservation for the purposes of study or comparison is much more easy and satisfactory. A considerable number of these, therefore, have this season been preserved by drying in the usual way, and are now available for comparision to assist in the determination of species, and will form a valuable addition to our Herbarium. Their history is not only interesting in itself, but it has lately become much more so by the researches of naturalists, in a laudable and by no means unsuccessful endeavour to trace the modes of life of those species which have lately gained so much notoriety by the havoc which they have made among our growing crops in various items of our food supplies, such as the Ergot of Corn *(Cordiceps purpurea)*, the Potato Blight *(Peronospora infestans)* and similar species. It was formerly believed that Fungi would only vegetate on dead and decomposing vegetables, but many of the minute parasites are only found on living plants, no part of a plant, indeed, either dead or alive, seems free from their attacks, and possibly no plant either. Many select the leaves, some the

tender branches, and others the dead and decaying stems. Some confine their attacks to one species—others to one genus, and others extend their favour to any and every species of the same family; how they manage to make their selection is more than I can tell; perhaps you may, some day, if you care to try. One thing is certain, that they always do know, some of them at least, and whether the others have a more extended choice, a wider field of pasture, or a less discriminating knowledge, who can tell? time and study may. One thing is certain, that one species is as certain to be found upon the leaves of particular plants and on no other as the sun is certain to rise in the east, whilst other less fortunate species have more than a dozen of these destructive pests, gnawing at their vitals. For many of these species we are indebted to the careful observation of some of our members, whose success is merely the result of making good use of their eyes. The common mushroom is by no means plentiful in this neighbourhood, nor does it generally grow to a great size, although, I believe, it gets leave for the most part to grow to maturity, wither and decay; their spores being scattered in millions to the breeze. We have seen it in the Back Walk, in the King's Park, about Dunblane, Kippen, and several other places, and about Port of Monteith Station more plentiful than anywhere else. There are several other species much more frequent, and according to some, much more deserving of the attention of the epicure, although all are alike unheeded and uncared for. The Chantrelle is said to be much more delicate in flavour than the mushroom, and is by no means scarce. We have seen it plentiful about Callander and in most of the more open woods around Stirling, and is readily distinguished by its fine orange tint, and its pleasant flavour, the gills running some distance down the stem. It is a sociable species, and when you meet with one, you seldom meet with less than a dozen. The edible boletus, too, is said to be excellent, and grows to a much greater size, and is anything but rare. There are several other edible species, but they are either of small size or of doubtful reputation. There is one species by no means scarce at present in several places near Stirling, and readily known by its pure white, upright cylindrical form, and which is said to be no bad eating in the earlier hours of its existence, but like most of its relations, its days, or rather hours, are few, and then it would be more likely to be

taken for a bottle of ink than for a breakfast. The insect world has this year received but little attention. Mr M'Dougall and one or two other friends have brought several species in the earlier stages of their developement, and some of them have proved quite interesting during the little scraps of their history, which we were able to trace, and we were only sorry that other subjects prevented us from giving that attention to these, which their great interest demands. Some branches of pine brought in during last autumn were covered by dark, rough looking caterpillars, which in due time formed their cocoons and retired to their winter sleep. In spring they made their appearance and proved to be a four winged fly, the *Lophyrus pini*, which often commits extensive havoc among the pines of this and other districts of the country. The cocoon is a very curious one, and I have not yet been able to ascertain with certainty how the perfect insect makes its escape from its hard paper like covering. At the hinder end of the case it cuts out a perfectly circular lid, possibly by means of the saw-like ovipositer in its tail; this, however, is seldom cut entirely round, a small hair-like fragment being generally left as a hinge; the little animal then pushes itself backwards until it is quite free, when it waits patiently the expansion of its wings to enable it to take its flight. It would be interesting to know, as I have failed to find it mentioned in any of the books, how the little creature comes to know when the revolving year has brought "our pleasant summer back again," and how it manages to cut out a door in the end of its home that it may get out to enjoy the delights of "the incense breathing morn." I have been able to give a little attention and only a little to the Gall Flies this season, and have named a few. They are a numerous and interesting tribe, and but little of their history has been read, and a great part of it is still unwritten; and yet there are many curious particulars still to be learned in the often brief and fitful history of their summer life. To Geology we need hardly refer, as the most important incident in its year's history is the visit of the Edinburgh and Glasgow Societies, which gave us great pleasure and was most interesting and instructive. Mr Moyes, however, has already laid before you the full details. It now only remains for me to give the Museum a passing glance, and then we have done. In the arrangement of the plants about two hundred more species have been placed on the paper, and

during the following season I expect to have all the flowering plants arranged. In a case belonging to the Macfarlane Museum, a very good commencement has been made by Mr Kidston, with a Local Collection of Fossil plants, and in our new case is at present being arranged a very good collection of Fossil Shells, Corals, &c., and a fair collection of British Minerals and Rocks is also available for those who may wish to consult them. There are still many other things, however, for which suitable cases are wanted. No additional books have been purchased during the year, except the books on Mosses and Fresh-water Algae, the numbers of which are coming to hand as they are published. I am greatly pleased to report the donation of a very interesting volume from Dr Galbraith, who has always taken a lively interest in the Institution. It is a work by Mr Swinton on the great Variety of the Insect World, and will be found a most interesting and readable volume. A second volume, I belive, is promised shortly by the same author, which the Doctor has kindly promised to procure for us when published. I would beg to move that the secretary be instructed to convey the thanks of the society to Dr Galbraith for the valuable donation.

A cordial vote of thanks was on the motion of Dr Galbraith, seconded by the Rev. J. E. H. Thomson, passed to Mr Croall for his paper, and for the very able and efficient way in which he continued to fill the office of acting president.

Mr David Chrystal, secretary, then read his report for the past year, as follows:—As in former years under our old *regimé*, this, the first report under our new title of the Stirling Natural History and Archæological Society will be divided into four parts, with the unusual addition of two appendices, viz:—(1) *Meetings.*—During the session the usual monthly meetings were held, save in January, July, and August. These meetings were fairly attended, though in this respect there is much room for improvement, and a great falling off from last year. No doubt the work of the association does not depend solely on the monthly meetings; but as they form the means through which the fact of our work, and our successes, reach the public, their importance is very great. The syllabus for last session was an attractive and varied one. Dr Galbraith put the members *au fait* with the most recent discoveries regarding the germ theory; Mr Paul, though a stranger, yet a

most welcome lecturer, illumined our minds on the subject of kitchen middens; Mr Croall, our devoted and trustworthy leader, has kept our botany to the forefront; local antiquities received able treatment at the hands of Mr Cook and Dean of Guild Shearer; your secretary brought forward the claims of ecclesiastical records to the attention and further enquiry of members; and lastly, though by no means least, Miss M'Lagan delighted our eyes with splendid tracings of the ancient crosses and tombstones of Islay and neighbouring islands, and supplied us with much true antiquarian lore thereon. Most of the papers above enumerated were really lectures, but your secretary would point out that, pleasant and instructive as these are, the object of the club is not so much lectures, as local work and explanation thereof. Next session it may be we shall have fewer long papers, and more of conversation and questioning. Members ought not only to come to hear, they should come to query, to give and to take. (2) *Membership.*—This shows some decrease accounted for, mostly, by death and removal. It is the duty of the members themselves to beat up recruits, and thus to add to the number of members. Would it be unfair to say something about the ladies. Last year the council obtained the society's sanction to levy an annual subscription of 1s on lady associates. Your secretary regrets to say that only 20 ladies have paid their shillings. Remembering the large number of ladies on the roll, when no subscription was exigible, we feel it would be unkind to draw any conclusion from this falling away. The thanks of the council were given this week to Dean of Guild Shearer, who has so kindly acted as treasurer during the session, but who has retired on account of his other pressing engagements. Mr Daniel Ferguson of the National Bank has kindly consented to take his place. (3) *Excursions.*—This division is one which falls to the president to deal with on his retiring address. It would seem by the non-success of this year's excursions that the plan of merely advertising from time to time will not bear repetition, if the excursions are to be in the future aught else than phantoms. (4) *Property.*—The society has this year added one case for geological specimens to those already in its possession. The work of "Fresh Water Algae" has been subscribed for; and Dr Galbraith has presented, with great kindness, a volume on Insect Variety. Having exhausted the four divisions as briefly as possible, it be-

comes necessary to deal with a very important question (alluded to in the circular calling this meeting), which has been under the council's consideration for some time past. You may remember that last year the name of the society was changed from the "Stirling Field Club" to the present title; and the following is taken from the published report of the last annual meeting:—"Minutes of meetings of the council were read, recommending that, in deference to a suggestion by Mr Murray of Edinburgh, the name of the institution should be altered so as to indicate a greater scope of work and that it be known in future as the Midland Counties Natural History and Archæological Society. Mr Moyes moved that the recommendation of the society be adopted, and in support of his motion said that the council had been in communication with Mr Murray, from whom they had received several valuable suggestions as to extending the influence of the club. In deference to these, members of council had talked the matter over, and many of them had come to see that a change of title would be beneficial. The next question was—what was the change to be? The name 'Stirling Field Club' was thought to be too much of a local term, and looked as if it referred to a private meeting of a few individuals. If a new name was to be given to the club, it should be such a name as would allow them to invite gentlemen in the district round about to become members and to subscribe to the funds to support a large museum for the district round about." The part of this paragraph which now immediately concerns us is in these words "Mr Moyes, in support of his motion said that the council had been in communication with Mr Murray of Edinburgh (one of the Macfarlane trustees), from whom they had received several valuable suggestions as to extending the influence of the club." After the annual meeting, as the council minutes show, some spasmodic jerkings towards action were made, but nothing definite was done. This state of affairs continued until August, when your secretary, who, like a new broom, had then a proclivity towards clean sweeping, put himself again into communication with Mr Murray. He did so because he considered that it would be a bad thing to come before you to-night with nothing more to say than that the name of the society had been changed, but nothing had been done to extend its influence, the reason assigned for the change. The result of his action was that Mr Murray, in a letter

dated 15th August, stated that he was prepared to recommend that this property (*i.e.*, the free library museum) be handed over to the society, if the society would undertake the charge and care of it by providing cases for it in the Smith Institute. At a meeting of council held on the following day, your secretary was instructed to write Mr Murray to ascertain the meaning of the term "hand over" as used in his letter, and also to know what value Mr Murray attached to the property he thus proposed to dispose of, and to report to the next council meeting. In reply to the letter written in accordance with the above instructions, Mr Murray sent the following definition of terms:—"By 'hand over' I mean that I am prepared to recommend that all the property in the shape of a museum, which the Free Library Trustees at present have, should be given into the custody of your society, for all time coming, but I think your society should not have the power to sell or to dispose of them to any individuals or other society, or public body, without the consent of the Free Library Trustees." This offer seems to your secretary to amount to a free gift with a reservation to the Trustees of the Free Library as to the disposal by our society of the collection. After this letter had been received, but before the council meeting, Mr Murray was in Stirling, when a previously arranged meeting took place between him and the president and secretary of our society. At that meeting Mr Murray fully explained his proposal, and stated that were this offer accepted he would give ten pounds towards obtaining cases. It is unnecessary to refer to the council meeting at which the offer was accepted, for you have heard by the minutes read to-night that the society at its September meeting approved of the council's resolution, and ordered that excerpts thereof be sent Mr Murray, and this was done. Reference ought, however, to be made to the remit made at the council meeting of 5th September to Messrs Hutchison and Chrystal as a sub-committee to frame a circular to be sent throughout all the district as to forming a local collection of antiquities, and carrying out Mr Murray's condition of obtaining cases. The draft circular was submitted to the council on Monday last, and though it is not yet approved of, there is one sentence which should be quoted as the key to the position. It is — "In making this appeal for funds, the council wish it to be distinctly understood that money is not asked to carry on the general work of the society. A

specific object . . . is in view." The council, on the motion of the secretary, seconded by Dr Rae, passed the following resolution:—"The council instruct the secretary to correspond with Mr Murray, as representing the Macfarlane Trustees, and also with the Smith Institute Trustees, for the purpose of ascertaining if these gentlemen will allow their names to appear in conjunction with that of this society, in the appeal for funds to carry out Mr Murray's proposals." On Tuesday Mr Murray was written to, but no reply has been received, and as the Smith Institute Trustees were in complete ignorance of the facts of the case your secretary delayed writing them pending Mr Murray's reply. Thus fully has the state of affairs been put before you, so that all may know the nature of the business referred to as of the utmost importance to the future welfare of the society, and it rests with the meeting to approve or disapprove of the last step taken by the council. Only one point more is within the province of the report, and that is the application by the council, along with the town of Alloa, Falkirk, Kinross, and Tillicoultry, for the Gilchrist Trust Educational Lectures for 1884-5. It only remains to apologise for the unusual length of this report, and to thank you for your kindness to the reporter during the time he has acted as your secretary.

Mr White moved, and the Rev. Mr Thomson seconded the adoption of the report, which was unanimously agreed to by the meeting. Mr R. S. Shearer, treasurer, next submitted a report of the state of the finances of the society, which was to the following effect:—Received from 48 members at 5s per session the amount of £12. Subscriptions from 20 lady associates at 1s, £1; and from transactions sold, 9s; balance in bank, 8s 5d—total, £13 17s 5d. Amount of expenditure—New glass case as per estimate, £3 5s 0d; printing account, £4 2s 8d; small sums, £4 7s 8d—total, £11 14s 8d. Amount of balance after paying all expenses, £2 2s 9d. A number of members have fallen off, others have left the town, so new members are required to fill up the vacancies caused by death or removal. The report concludes with the hope "that under the new treasurer and the energy of the secretary the session of 1883-4 will be a successful one, as it would be a matter of regret that the society should not prosper, considering the great advantages it possesses in our chairman, Mr Croall, and the

excellent rooms we have at merely a nominal charge." This concluded the business. A large number of beautifully dried and mounted botanical specimens were laid on the table for the inspection of members.

Stirling Flora, Additional Species since 1881.

FLOWERING PLANTS.

Honckenya peploides.
Erodium moschatum.
Ononis arvensis.
Alchemilla conjuncta.
Peucedanum ostruthium.
Carduus crispus.
Campanula rapunculoides.
Veronica Buxbaumii.
Borago officinalis.
Glaux maritima.
Plantago lanceolata.
Sparganium simplex.
Bromus sterilis.

MOSSES.

Sphagnum compactum.
,, rubellum.
,, subsecundum.
Phascum cuspidatum.
Gymnostomum rupestre.
Weissia controversa.
Dicranella subulata.
Dicranum majus.
Physcomitrella patens.
Polytrichum formosum.
Cryphœa heteromalla.
Eurynchium piliferum.
Hypnum stellatum.
,, sarmentosum.

STIRLING

NATURAL HISTORY AND ARCHÆOLOGICAL

SOCIETY.

TRANSACTIONS, 1883–84.

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CONTENTS.

PAGE

Nov., 1883.—Meeting, ... 1

Weeds—What they are, and what to do with them: by Alex. Croall, Stirling,... 1

Dec., 1883.—Meeting, ... 12

Notices of the Fortresses and Dwellings of the Ancient Peoples who inhabited the Valley of the Forth and its tributary, the Teith: by Miss Maclagan, Stirling, ... 13

Feb., 1884.—Meeting, ... 25

Spurious Ballad Poetry: by James Todd, F.E.I.S., Stirling, ... 26

Note on Plant-bed at Todholes, Earl's Moor, Bannockburn: by Robert Kidston, F.G.S., Stirling, 26

March, 1884.—Meeting, ... 26

A Sketch of the Romanised Britons of the Kingdom of Strathclyde: by Rev. John M'Intyre, Greenloaning, ... 27

April, 1884.—Meeting, ... 33

The Ancient Gaelic Church: by Charles Stewart, Tigh'n-Duin, Killin, ... 33 & 35

Local Museum, ... 34

May, 1884.—Meeting, ... 40

Notes on Elateridæ — Subject, Wireworms: by Gilbert Macdougall, Stirling, ... 41

June, 1884.—Meeting, ... 50

Insect Miscellanies, or the History of Entomology; by Alex. Croall, Stirling,... 50

Sept., 1884.—Meeting, ... 51

Local Museum, ... 51

Notes on Exhibits—Archæological, Botanical, and Mineralogical: by Alex. Croall, Stirling, ... 52

Excursion to Airthrey Loch, ... 53

Excursion to Forth, ... 54

Excursion to Lake of Menteith, ... 54

Excursion to Leny and Gargunnock Hills, ... 56

Excursion to Crieff, ... 56

Exhibits by R. Kidston, F.G.S., ... 56

Oct., 1884.—Meeting, ... 57

President's Address, by Alex. Croall, Stirling, ... 57

Secretary's Report, by David Chrystal, Stirling, ... 57

Motions to alter day of meeting and extend area of the Society's operations, ... 64

STIRLING NATURAL HISTORY AND ARCHÆOLOGICAL SOCIETY.

The monthly meeting of the above society was held in the Smith Institute on the evening of Thursday the 1st Nov. Mr Croall in the chair. There was only a very small attendance of members. In the absence of the Rev. J. E. H. Thomson and Mr David Chrystal joint secretaries, the minutes of former meeting were held as read. The election of Mrs Mathie as an associate and of Mr M'Bean as a member of the society was intimated. Thereafter the acting president read the following paper on weeds, what they are, and what to do with them:—"Well, these wretched weeds, there is no end of them; there they are again, just as fresh and lively as ever, although I have cut them up some dozen times!" "Well, really," says the gardener, with his paddle, "it is quite useless, the more we cut them the more they grow! I wonder for what purpose such nasty things were ever created?" "Really," says the farmer, "our labour would be quite a pleasure were it not for these noxious and troublesome weeds, which seem only to grow for our vexation, as I can see no use they are of in the world." No doubt of it my good fellow, Mr Farmer, they are just made for this very purpose, not indeed to vex you or even annoy you, but as a spur to your activity. Man is not only a locomotive being, but a locomotive of the highest class. Vegetables must grow where they are planted, or remain where they spring up, constant moving would peril their existence. Man is just the reverse, constant inaction would peril his well-being; on a certain degree of activity depends his happiness, his life, and one means of stimulating this activity is the constant and unceasing growth of these little weeds that give you so much trouble. Were it not for these troublesome little fellows, your well-being, your very life would be imperilled. There are hundreds of other wise and useful purposes which they may serve in the great scheme of creative wisdom, but as far as man is concerned, their presence to the farmer or gardener is of vast importance. The doom pronounced on us

after the Fall was not so much a curse as a prophetic blessing, and this purpose, in our yearly battle with the weeds, we would do well always to keep prominently in view, it will greatly "lighten our labour" and "sweeten the toil," and will act as a counter agent to that spirit of grumbling to which we are said to be so prone. We will thus be led to look upon weeds, not so much as enemies as good friends, placed most conveniently at your elbow, just as it were to pinch our ears when we begin to become drowsy or lag in the battle of life. The very fact of their existence might satisfy us of their utility, for the all wise Creator has made nothing in vain—the most worthless weed that springs from the clod, the minutest moss that greens with its microscopic foliage, the mountain's rocky brow, each in its own way, humble though it be, has a great and important duty to perform, in the beautiful mechanism of Creation. Not one of them is there in vain—it forms a part, and who shall say how important a part, in the vast design of the Universe, a link in the beautiful chain of Creation, without which the whole would be imperfect and incomplete. With this view of their value and importance in the vegetable world constantly before us, let us set to work in good earnest, not, however, with the stern purpose of exterminating a ruthless enemy, but of bringing him under subjection, and of teaching him obedience. Let us then, in the first place, endeavour to obtain a glance at the numerical and physical strength of our adversary, in order that we may be able to ascertain whether we be really a match for him, and to enable us to contrive the best means of obtaining a victory. For this purpose let us first notice the vast numbers, the enormous reproductive powers of most kinds of plants, and particularly of those most generally designated weeds, and we will at once perceive that our enemy, if we choose to call him so, is by no means contemptible. We have taken some pains to ascertain the reproductive powers of some of the most common weeds, and although they are extremely variable, depending in a great measure on the favourable or unfavourable circumstances for their development, yet under ordinary circumstances, in many cases, they are scarcely credible, and will at once account for the great profusion with which they so perseveringly appear whenever the ground is turned up afresh, and which has given rise to the belief that they were produced by spontaneous generation, or without the aid or inter-

vention of seed, which does not in any case seem to be the fact. All plants would appear to rise from seed, as all insects are produced from eggs, and the astonishment caused by their immense numbers will be greatly lessened when we consider their extraordinary powers of increase. The farmer will in general be very happy if he can obtain a return of 50, 60, or 100 fold, but weeds are in general more prolific; very few of them indeed descend so low as a hundred fold, and, indeed, not a great many perhaps below a thousand, while numbers of them produce, according to calculation, five, ten, fifteen, or even twenty thousand seeds. With this enormous increase, no wonder that they should be so incorrigible to eradicate; no wonder if they do spring up apparently in defiance of plough, and hoe, and harrow. In this vast power of increase, however, we have another proof of the care and goodness which an all-wise and beneficent Providence exercises over His creatures, by which their daily wants are so abundantly supplied from his never-failing bounty. On these seeds, minute and worthless as they may seem to the eye of man, depends nevertheless the lives of thousands of his creatures through the long and dreary months of winter, and indeed throughout the whole year they form the "staff of bread" to thousands. It is from this vast granary not only that the numberless winged denizens of the air receive their support, but from them also is derived the rich carpeting of the green hill-side, the glowing and ever varying tints of the flowery meadow, and the dense velvet of the verdant lawn. Seeds, however, do not form the only means of increase with which plants have been furnished; their procumbent branches often take root at the joints, and long creeping tendrils do the same, and extend in all directions for many feet; others effect the same purpose by their creeping roots, and it is not unworthy of notice that the more these are cut or divided, the more rapid the increase, as every joint becomes a new plant, and is thus a nucleus of renewed increase. Bulbs and tubers are also most efficient means of enabling plants to increase their numbers, and although in the case of weeds, these are all means of rendering them more difficult to subdue; yet the farmer should not forget that these are also the means of enabling him to render them more useful and profitable when he has thought proper to bring them into cultivation. No wonder then that with such vast and varied powers of increase, the fields of the

farmer should so rapidly become over-ran with weeds when, either from carelessness, indolence, or inefficiency, he has neglected to keep them in due subordination, and has permitted them year after year to ripen and scatter their seeds by thousands till the ground is literally filled with them from top to bottom; no wonder if the birds of the air also prevail against him when his fields are exhausted in raising food for their support instead of provisions for himself. Besides the above, some seeds have a peculiar means of extending their domain, by which they are enabled to spread with much greater rapidity and to a much greater extent than any other plant. Such are thistles, tansies, hawkweeds, and such like. The seeds of these plants have their summits furnished with a series of beautiful light and transparent hairs, which are sometimes simple and sometimes beset with hairs or branches in a very complicated manner; they are, moreover, extremely hygrometric, and when ripe and warmed and dried by the heat of the sun, they spread out in the form of a beautiful parachute, light as the gossamer to float upon the breeze, by which they are borne along, often to vast distances, and the range of the species is thus extended almost indifinitely in a very short period of time. These plants, too, are often the most prolific, and were it not that other agents are provided to counteract their increase they would soon spread over the whole surface of the earth. Of this we were lately furnished with a very striking example in Australia, to which a few seeds of the Scotch thistle had been carried by some patriotic Scotchman and sown in his garden. These grew and in a few years spread over the country to such an extent that the government were obliged to interfere and offer rewards for their extirpation. We shall only advert to one other means of extending, or rather of continuing the species of plants, and it is perhaps the only other really worthy of notice as to any great extent affecting the farmer. Many seeds are abundantly furnished with an essential oil which enables them to retain their vitality, when buried in the ground for many years, and when again exposed to the action of sun, air and light, they immediately spring to life and vigour. Against these it is no security that they are buried in the soil; this will only prove the means of their preservation, for no sooner are they again turned up by the plough than they are ready to renew the contest with the farmer, and he will find to his cost that

he has first to "fight all his battles o'er again, with this disadvantage that instead of having to wage war with the produce of *one* year, he will have to fight the battle with the accumulated increase of perhaps, centuries. After having thus fully noticed the various properties of weeds which appear to render them deserving of the farmer's special attention, for the purpose of devising the best means for their extirpation, it may be only fair to advert for a little to some of his allies, whose aid he would do well not altogether to overlook in his war with the weeds as they will be found to be most powerful auxiliaries, in keeping within due bounds some of the most numerous and prolific species. We allude both to birds, and insects, which independent of their importance as adding life, beauty and melody to the landscape, appear to serve an important purpose in the economy of creation, by the havoc which they are constantly making on the various species of plants which constitute the chief portion of their food. It is therefore only when the bird or insect exceeds its due bounds, by the undue destruction perhaps of its natural enemy, that it ceases to be the farmers friend. Birds destroy vast numbers of seeds and consume immense quantities more, and besides act a most important part in keeping the balance of power between themselves and the insect tribes, of which the numbers they consume must be something very extraordinary, and must amply compensate the farmer, we should suppose, for the little pilferings they occasionally perpetrate in the corn field or in the stackyard. The poet says, and we would sincerely add our mite of influence to his dictum—

> "Don't kill the birds, the little birds,
> That sing about your doors,"

for they are really your best friends, and will, during the autumn and winter, do as much good, we believe, in destroying both seeds and insects as will amply compensate for the little grain they will pilfer during the time the crops are in the field, and you have their cheering melody and sweet companionship to boot. For the purposes of the farmer it will not be necessary to distinguish weeds by any scientific classification; it will be enough for him that the arrangement is technical, or rather practical. For this reason we shall simply divide them into (1st) Annual, (2d), Biennial (3d), Perennial, as each of these divisions, as far as his operations are concerned, will require from him a very

different treatment. Annual plants, or more briefly, Annuals, are such as spring from seed, and again die in the course of the same year, generally in the course of five or six months. Of these the roots die as well as the stems, and their only mode of reproduction is by means of seeds. For these the means of eradication in the power of the farmer is twofold—first, prevention; and second, cure. That prevention is better than cure, will in this case as in most others, at once be admitted, I think, when we remember the enormous number of seeds produced by some species of plants, so much is this the case that the produce of one year will take years of repeated toil before they can be again cleared from the soil. These weeds are always most abundant in cultivated ground; in pastures they are not troublesome, but whenever the ground is broken up, they are sure to make their appearance in the greatest profusion. A potato, bean, or turnip field, for instance, is sure to be covered by them, and sometimes so abundant that one would hardly suppose the ground could have contained the seeds. Were these all suffered to grow, very little harm, perhaps, would be done, as the one half would choke and starve the other, but when a few plants here and there are allowed to remain, the profusion of seeds they will produce is often so great as to cover the surface of the ground. Whether these will grow before being buried in the soil, has not yet, I think, been sufficiently proved, various circumstances that have come under my observation, seem to lead to the conclusion that in some cases at least, they will not, yet be that as it may, there is no doubt that they will spring again although long buried in the soil, and the only way the farmer can with certainty get rid of them is to cut them down before they are in seed. There is no use in doing it after, unless they are removed altogether and destroyed, for if cut down and left on the the ground, they will shed their seeds as well as if allowed to grow, and the seeds altho' not quite mature will grow as readily. One of the great advantages of the rotation of crops is that every three or four years the ground can be effectually cleared of the weeds, that have accumulated during the iuterval, and which can not be effected so easily or so well by any other means. It is no uncommon thing to see a potato or turnip field when the crop has nearly reached maturity, still so covered with weeds as to, in a great measure, conceal the crop, the same may be often said of corn.

To remove these would certainly entail some expense but in every case it would be a saving in the end and we have seen careful and foreseeing farmers set a dozen or so of people into a field of potatoes just before ploughing up the potatoes, to pull up the weeds by hand and then cart them off the field, although they could have been removed with less trouble and at less cost, along with the potato stems, after these were ploughed up, but then, vast quantities of the seed would have been knocked out and thus the saving in the first instance would have been "penny wise and pound foolish," as the trouble and cost in destroying the produce of these seeds would be greater than that of removing the old plants. And this the farmer is almost always certain to find to be the case; the trouble of removing the produce of one weed will be cheaply set down as fifty times that of removing itself. We have already observed that these weeds (annuals), are not very troublesome in pastures or in hay, and indeed it is only where this crop has failed, or is neglected that they, in any quantity at least, make their appearance; in the first case the best remedy herhaps would be to saw some grass seeds,—rye-grass *(Lolium perenne)* or the annual meadow grass, *(Poa annua)* would soon cover the soil and thus prevent the growth and increase of weeds. Where that cannot be done the weeds should at least be cut down carefully to prevent the ripening of the seeds. In the second case, either an excess of moisture or want of manure is the cause, and in the one case draining will at once ensure the remedy, or in the other a more liberal supply of nourishment in the shape of manure. The second class of plants which we propose to notice are those called biennial, or which produce their seeds and then die on the second year of their life. These are of all others the least troublesome to the farmer, especially on farms where regular rotation of cropping is adopted, as they have always two chances of being destroyed for one they have to be saved, and as they only seed once in two years, their power of increase is greatly diminished. Seeds, too, constitute, as in annuals, the only means of increase, and the farmer will have no difficulty with these, either in grubbing them up when young or of cutting them down when further advanced, but before they have run to seed. We now come to the last and most important division, or those termed perennial, being such as have perennial roots. Of these the stems die down every

season after producing seed, but the roots survive and send up fresh herbage on the following season, continuing to do so for an indefinite period. These are the most troublesome to the farmer; they are like cats, possessed of a thousand lives, and although prevented from increasing in one way, their energies are only stimulated the more in some other, and thus the farmer not unfrequently finds that, as in the poet's symbolical tale of "John Barleycorn," when he supposes that he has buried them safely in the ground, they only spring up with renewed vigour, and stronger, more numerous, and refractory than before. For these stubborn fellows, two modes of treatment are necessary. First, the farmer must remember, that cutting and mangling, instead of killing them, only adds fresh vigour to their growth, and nothing will effectually destroy them but sheer starvation, pull them, or shake them up by means of harrows, rakes, forks, or hands, or all, when the weather is dry and expose them to the weather till quite dry, or gather them in a heap to rot as manure, or rather as mould, which will be very useful afterwards to mix with manure. This may be said to be the treatment generally applicable to these weeds, but their modes of increase is so variable, that we had better subdivide them into separate sections in order to be able to treat them according to their different properties or modes of reproduction and growth. First then, those that have fibrous roots, such as most of the grasses, will be easily managed as above, and are seldom more difficult to deal with than annuals; but many others, having creeping roots, require much more vigorous treatment. The most generally troublesome of these, especially in light sandy soils is the creeping wheat or couch grass *(Triticum repens)*, which in such soils when much neglected I have sometimes seen so completely over-run the ground that, when ploughed over, it resembled the back of a porcupine. One great advantage of these weeds is that they are almost as tenacious as whipcord, and the harrow will pull them up and collect them together like a quantity of cordage, when they can be easily laid in heaps and burned or allowed to decay for mould. It must always be remembered, however, that the smallest fragment of these left in the ground will grow and produce a new plant, and that a few such fragments here and there in a field will, in a wonderfully short time, again over-run the field as badly as ever, so that the more effectually they are at once cleared out

the less trouble they will be ever after. These and indeed many other weeds are always the most troublesome in poor soils, and no sooner is a field "brought into proper heart" than the weeds naturally disappear without further trouble. This seems to be the case with creeping Couchgrass, as it seldom becomes very troublesome in rich and well-manured soil. There are several other varieties of roots, which although not troublesome by their numbers are more so by their shady and bulky character. These are such plants as dock and thistles. These do not care how good or how rich the soil may be; and. indeed, the richer they like it all the better, and their strong, simple roots readily pass through the harrow and escape its fangs. The best treatment for these is to pull them up by hand as soon as they get strong, but by no means allow them to run to seed, as that is extremely abundant. The roots of thistles run to a great depth in the soil, and it is almost impossible to extirpate them otherwise than by constant pulling. I have known them extend to a depth of upwards of twenty feet or more in a stiff clay, and the smallest fragment of such a root left in the ground will soon send up a fresh shoot, for until it becomes exhausted by being constantly cut or pulled up, in which case the vital energy seems to become exhausted, the root does not die. We might now notice some peculiarities in the treatment of weeds which the farmer is too apt to overlook. We have frequently observed farmers by no means careless in weeding their grounds, and whose fields bore testimony to no small degree of attention in this respect, but whose labours were in a great measure neutralized by their carelessness with respect to their lanes, avenues, hedgerows, and other waste grounds, where thistles, tansies, and dandelions and such like plants were suffered to grow on without interference, scattering their seed in countless myriads; and which were wafted by the winds in every direction, till not only the farmers own fields, but even his neighbours were sufficiently stocked for miles around. The seeds of these plants, as we have already noticed, are furnished by nature with the means of being wafted by the slightest breeze often to great distances, so that very few of them are dropped in the spot where they grew, and consequently those plants which grow out of the fields, in the lanes, meadows, and waste grounds about, are more to be dreaded by the farmer, and should be more assiduously, if possible, cut down and destroyed before

running to seed, even than those in the fields. These are too often entirely neglected, whereas whenever they are furnished with these light-winged seeds they ought to have special attention. Another hint might here come in very opportunely. These same weeds should never be allowed to come to seed at any season. Many farmers think it sufficient to attend to weeds in spring, forgetting that a few even that are left at that season, or that may spring up after spring cleaning, may be quite sufficient to stock a whole farm with noxious weeds. A day of a worker in a field would be a mere trifle to pick out a few weeds here and there before running to seed, compared with the enormous amount of labour necessary to clear the ground from those thousands that are the produce of these, not only next year, but year after year, whenever the soil is turned over. We now come to a very important part of the subject, namely, draining. "Well, what on earth," says the farmer, "has that to do with weeds; what connection is there between draining and weeds." Very much my dear, Sir. Any farmer who has had a field drowned for years in water, and who has taken the trouble to drain it thoroughly, would not have failed to see, as soon as the field was drained, what a vast change came over the vegetation, even without any additional manuring. The coarser weeds and grasses would disappear and sweeter and more nourishing grasses and plants, not formerly observed in the place, would come up in their room. Now, what are we to make of these facts; they are no doubt intended to teach us some important lesson, and this perhaps among others, that the plants of any locality readily indicate the condition of the soil, and teach us what it is in want of. Thus the farmer will soon observe that certain plants grow in wet spongy soils and in places where water stands; some will only grow in a dry and sandy soil, others where the soil is deep, rich, or loamy. The first of these are of little value to the farmer as they are coarse, harsh, and contain but little nourishment, and are only eaten by the cattle in lieu of better fare. Horses will frequently eat them, even in preference to better. They are also of great value in the economy of nature, as they are generally abundant in foliage, and are well calculated to fill up those hollow marshy spots, and render them fit for cultivation. They thus become, as it were, the farmer's friends, and prepare soil for his furrows by a natural process before he has learned to do so by artificial means. In passing

through Cheshire and many other places, the traveller is struck with the appearance of many of the fields, covered as they are in many places with rushes to such a degree that they resemble a marsh rather than a cultivated field, while in others the furrows resemble young hedges, the rushes, from the want of draining, having grown there to the exclusion of everything else. The rush here referred to is the Hard Rush, *Jancus glancus*, of botanists, rather scarce in some parts of the country, but certainly not by any means in Cheshire, where I have no doubt it is often honoured by the farmer's anathemas as being his acknowledged foes. Such, however, they are not, if rightly understood, and their message rightly interpreted. The farmer looks over his fields in the morning, and there they are staring him broadly in the face. He returns in the evening as the sun slowly sinks among the clouds of the western sky, the dark, lank shadows of the rushes stretch from side to side of the field. In despair he seizes the pruning knife, and with unpitying sweep the scythe lays them level with the soil, but like "John Barleycorn" in the old song, they are soon up again, and look fresher and greener than ever. 'Tis all in vain, says the crestfallen farmer, they are just like ill-tempered children—the more you curb them the more determined they become. Even so, but why not take a different plan with plan? Why not strike at the root of the evil; at the root, not of the plant, but of the evil, and that lies deeper even than the roots of the rushes. Well, and where is the root of the evil, and what is it? Why, do you suppose that these plants would grow in dry sand? Certainly not. Then drain of the water, and the plants will die; die outright a natural death—die of sheer starvation, and the ground will not only be clear of them, but other sweet and nourishing plants will soon appear in their room, or if the ground is tilled, it will be in a fit state to afford nourishment to other and more useful plants that you may wish to sow. Water, then, is the evil; draining is the cure, and a most efficient one in all similar cases, for there are other plants not less troublesome to the farmers than the rushes that live on the same food. These are most inveterate water-drinkers, and if you withdraw from them their daily supply, death is the inevetable result. Wherever these water plants abound you may be sure that there is an over-supply of water, and that draining to a greater or less extent is wanted, and will soon remedy the evil. All

others are useless till this is applied. Plough, however carefully you may ; throw in whatever quantity of manure you can, it will be of no avail ; as long as the soil is chilled by excessive moisture, all other efforts will only be labour in vain. What then says the farmer is the use of these wretched pests, and why should the very best of the land be overun with them? Why, just to tell you what is to be done, in order to improve the soil and render it fit for other purposes. These rushes are just the finger-post at the crossing of the roads to tell you which way to turn. Instead therefore of being your enemies they are really your best and surest friends, and will always give such information as cannot possibly mislead. We may here point out a few of the plants that are equally sure indications of an over-abundance of water at these rushes. These are. The hard rush (as noted above.) The soft rush *(Juncus effusus.)* The sharp flowered jointed rush. *(J. acutiflorus.)* The toad rush. *(J. bufonius.)* The bristle-stalked mud rush. *(Isolepis setaceus.)* The corn mint. *(Mentha arvenris.)* The penny royal. *(Mentha Pulegium.)* The common self heal. *(Prunella vulgaris.)* The marsh waundwort. *(Stachys palurtris.)* The marsh cudweed. *(Gnaphalium uliginosum.)* Meadow crowfoot. *(Ranunculus flamula)*, &c., &c. Some of these are very important to the farmer as they may be relied on as sure indications of a soil drowned by water, and indeed it seems at no great moment to the plants of what nature the soil is provided there be abundanoe of moisture and that be allowed to sour and stagnate on the land. These are particularly, the rushes. The self heal. The marsh cudweed &c. These are never seen in a soil that is as the farmer says "in good heart," and as soon as any land, whatever its character or mineral constituency, has been dried even although no manure had been added, these plants are sure to disappear. We shall now finish our "weeding," and wish the farmer may do his with as much good will as we have attempted to assist him in his task, it will be all the easier if he does so.

"Labour sweetened with good-will,
Is doubly sweet."

A vote of thanks to Mr Croall terminated the proceedings.

The usual monthly meeting of this society was held in the Smith Institute on Thursday evening, 6th

Dec., 1883—Mr Croall presiding. There was a large attendance of members and lady associates. After minutes of former meetings had been read by Mr David Chrystal, secretary, the chairman in appropriate terms introduced Miss Colvin, who read a paper on "Notices of the fortresses and dwellings of the ancient peoples who inhabited the valley of the Forth and its tributary the Teith," which had been prepared by Miss MacLagan. The paper which we give below, and which is a most valuable contribution to the archæological history of the valleys of the Forth and Teith, was rendered still more interesting by the admirable series of drawings, also executed by Miss MacLagan, of the "brochs" referred to. These were handed round for examination, during the lecture. A very hearty vote of thanks to Miss MacLagan for her admirable paper, and to Miss Colvin, for having read it so gracefully, was moved by Dr Galbraith, seconded by Mr D. Chrystal, and carried by acclamation. This concluded the business. Miss MacLagan also exhibited rubbings of ancient Celtic crosses from the island of Tyree, which were greatly admired. Specimens of lead, tin, and copper ores from Caithness and of tin ore and tin from the Anderton Mine, Whitestock, kindly sent by John Gunn, Esq., Dalehouse, and by Mr James Murray, were also shown. Mr Gilbert M'Dougall exhibited specimens of "fungi," and Miss Colvin, leaves with galls of the tree said by the Egyptians to be that under which the child Jesus and His mother rested on their arrival in Egypt. The next meeting takes place on the first Thursday of February. Miss MacLagan's paper was as follows:—

NOTICES OF THE FORTRESSES AND DWELLINGS OF THE ANCIENT PEOPLES WHO INHABITED THE VALLEY OF THE FORTH, AND ITS TRIBUTARY, THE TEITH.

The following notes and sketches are intended as a small contribution towards the knowledge of the British antiquities of our own valley. We begin with those that are situated on its southern slope and at the eastern end of it. The first of these is the Tappoch, in the parish of Larbert, and on the farm of Torwoodhead. To those who look on this place as at present it appears to us "Tappoch"—a Scottish word signifying a small hillock—may seem little descriptive, but a few years ago it was sufficiently appropriate, for then it showed as merely a conical mound on a hill-top. A change came over it. The proprietor, in walking over the

said "Tap," began to suspect that its outline was not that of Nature's handiwork, and having it dug in to laid bare the ruin which now meets the eye as a good specimen of the "Broch," an architecture, which, during a considerable part of the early history of our country, was the chief form of its strongholds. The Tappoch is situated on a wooded hill of small elevation, whose descent southward is towards the river Carron, north and eastward to the valley of the Forth, while to the west it presents a bold precipitous front, on the brink of which the fort is founded. The whole of this, and many surrounding hills, were formerly covered by the great Torwood, said to have been the last lingering remains of the primeval Caledonian forest. It is somewhat noteworthy that during many successive and comparatively modern ages we find it said of one defeated army after another in the history of our national wars, that the "fugitives found refuge in the Torwood." Can it be that they fled to the shelter of the Tappoch and its neighbouring strongholds? Here, too, an undefeated warrior had his haunt. Sir William Wallace ofttimes mustered his followers during his patriotic wars in this place, and there long remained a tree—one of the largest in Scotland—which was known as "Wallace's Tree." In his day it was aged and hollow, affording shelter to him and his men within its goodly circumference. It was said to be surrounded by a stone wall, but wall and tree have alike disappeared. After the battle of Stirling, where Wallace defeated the English, he pursued them to the Torwood, and there a second time was victorious. Another of Scotland's wars was here in part fought out. This time the battle was with the enemy of its faith. The warrior was Donald Cargill, who as a "good soldier" of Christ bravely "in the name of God" solemnly excommunicated King Charles II. of infamous memory. The southern slope of this forest overhung the great Roman Wall, and when we think of the impenetrable forest, the rugged mountain land, and the wonderful strength of these towers, we can perceive how difficult it must have been for the Romans to drive out, from these their "Brochs," a warlike people so lodged and hidden, and they failed to do so! The Tappoch is fortified by 3 walls, the area of the inner circle is 33 feet in diameter at the lower portion of the wall. It is 2 feet greater in the upper portion, for after the wall rises to about 8 feet in height it then with most regular masonry retires one foot all round the

building, and then continues perpendicularly to 5 or 6 feet higher. Evidently this wall had once been much higher than we now see it to be. The increase in diameter occurs on a line with the lintels of the two doorways, and on the sort of shelf formed by this retirement of the wall, there had most probably rested the roof-beams of the lower story of this centre tower of the building, for tradition assures us that all these castles had roofs. From the circular bend in what remains of a stair (of 10 steps) in the wall, it seems likely that there had formerly been an upper storey to which it had led, for the bend does not point outwards. The enlargement in the higher portion of this structure is common to many others of the same kind.* The stair above mentioned is 2 feet 6 inches wide, and the length of the passage leading to it is 11 feet. The lintels of its door and that of the main door are both formed by two great stones, the one laid above the other, so as to give strength sufficient to up-bear even such a mass of wall as we are supposing to have formerly rested upon them. This wall is 21 feet in thickness, and in the passage leading outward through it there occurs near the middle of the wall another pair of such door-posts and lintels, where undoubtedlv the true gate had stood. These door-posts are 7 feet 6 inches high, and the doorway itself about two and a half feet wide. The inner half of this entrance way bulges out into somewhat of an oval form, which serves as a recess in which to lay aside the great stone door usually found in edifices of that period. The outer half is a straight line, and the whole is roofed with long stones stretching from side to side. Masons say that these stones are arranged with skill, and the same may be said of the placing of the door (that is in the centre of this 21 foot thick wall), for when we remember that the whole structure is built with stones unbound with mortar nothing but great mass could afford any stability to a door so circumstanced. At the distance of 30 feet from the innermost wall there occurs another and semi-circular wall, having the two ends of it resting on the brink of the precipice ; part of it is still 10 feet

* Those who are acquainted with the round towers of our country are aware that such like stairs and passages almost invariably are found running up through the centre of the walls, often to a very great height, as we still see in the towers of Glenelg, Mousa, &c., and the tower now under consideration, having walls 21 feet broad, may reasonably be argued to have been one of the loftiest. The walls of Mousa are only 13 feet broad and are still 45 feet high.

high and 10 feet broad; and again at the distance outward of 30 feet there is another semicircular wall, which is about 4 feet high and 7 feet broad. The fact that these 2 walls are only semicircular—having open space at both ends—obviously proves that they could not afford the smallest defence to the fort against the assault of an enemy. Assuredly these walls must have originally formed complete circles, or the open spaces between them had been closed by a straight wall on the brink of the cliff. It is no small proof of the antiquity of the place that by the mouldering of the rock on which they must have stood, they have finally disappeared. The entrance to this stronghold seems to have cut by a straight line right through all the three walls, and that in a northerly direction. In digging out the rubbish from the central chamber, there were found some stone balls, two querns, and two stones having on them these circular markings which are now so much attracting the attention of antiquaries. Even the mighty hand of time could but very slowly have wrought scathe to walls so strong as those of the Tappoch, but the hand of man has the while busied itself at the evil work of removing their materials, and as might have been expected, the outer wall has been the greatest sufferer. In the surrounding walls of many a field, and those alongside of many a road, we see a prodigality of goodly masonry, which tells distinctly that the stones with which they are built were cheaply got. From our tower down to the high road there is a way, 10 feet broad, paved with stones, no doubt so made to assist in the process of their removal. There is about half a mile of this pavement. It is not Roman work; it is too broad to be ancient British, so doubtless it is modern, though in our times we seldom pave our rural roads. Here, however, the stuff for doing so was ready at hand. The above description may appear to some to be unnecessarily minute, but it is so intended, because to understand this one structure rightly, is rightly to understand the whole class to which it belongs. We now pass on westward about two miles to where there is a rocky knoll, perhaps not more than 50 feet in height. It is precipitous only on one side, and there a stream winds around it. On the north side of this knoll is to be found a small underground structure. This chamber is in the form of the letter V, and to those who are acquainted with lime kilns, we may compare it to that. This building is 12 feet deep, by 6 feet wide,

at the bottom, and 10 feet wide at the top. It leans against the rock on which the fort is built. There is a covered way leading out from the bottom of this curious place, of which 30 feet still remain. Eight feet of it has a roof formed of large stones which reach from wall to wall, and the space between these walls is 2½ feet wide. This "Way" may have led to the water supply of what appears to have been a round castle, larger than the "Tappoch" itself; but as this hill is of very easy ascent, there now remains only a very dim outline of its walls, the easy access having made the removal of its stones all the more complete. From the great number of shapen stones, and also from the circular arrangement of these, it seems highly probably that the small round chamber formed part of a large fort, which had formerly covered the whole rocky mound. On taking an eminent antiquary, the Rev. J. Joas, LL.D., to inspect this place, he at once affirmed that there ought to be no doubt of its being the site of a large fort, though to an unpractised eye this fact would not at first appear. Here again we observe in farm walls around, that abundance of shapen stones which affords a hint of the ease with which they had been procured, and justifies the saying that "a shapen stone never lies long on the road."

ROMAN ROAD.

The Roman road, on its passage to the north, skirts along the southern slope of Torwood, and appears by fragments in the following direction (sometimes very distinctly marked, at others much defaced):—By Plean, Milton of Bannockburn, Milton of St Ninians, and Cambusbarron, thence across the Forth at Kaimes, near Drip, the river—not yet swollen by junction with the Teith and Allan—being there so narrow that a felled tree might have served to bridge it. We have abundant trace of the line of march of these Roman invaders in going through our valley up towards Blair Drummond, where probably they crossed the Teith, and then following the level of the river Ardoch, arrived in safety at their celebrated camp at Ardoch, a thing which it would seem in a military point of view they never could have achieved by following the steep, narrow course of the Allan, though that is the route most commonly believed in.

PLEAN.

Passing eastward for some miles through what

may have been a continuation of the ancient Torwood, where we have so long lingered, we come to near the mansion-house of Wester Plean, where are traces of a large circular Fort, in diameter about 240 feet. Its area is level and surrounded by a rampart mound, whether of earth or stone we know not. An old man—native of the district and a herd at Plean—used to relate to Mr M'Kenzie (formerly gardener there) that in his youth the inner circle of this Fort was all paved with stones, and also that he assisted in carting them away to do the repairs at the farm steading. We are indebted to Mr M'Kenzie for this information.

STIRLING.

In the centre of the valley, and crossing it at right angles, is a line of rocky eminences anciently called the Govane Hills (now the Gowlin), and on the most southern part of these rocks is Stirling Castle, on whose site we are told there once stood only one round castle or tower; and in the oldest notices of this place we have it called a Dune—first it is "Snadune," then "Snawdune," then "Snowdown," and by and bye, when we hear of a town being added to it, it is called "Strevilling" and "Sterling," the poet Lindsay calls it "Snawdun, wi' thy towris hie." Sir Robert Sibbald and Mr Horsley speak of the remains of a Roman station visible in their times. Early in the last century the Praetorium still remained, and was described as being fortified with three ramparts of earth with fosses, and these ramparts so high that "a man on horseback could not see over them." We are inclined to take these walls from the Romans, and claim them for our forefathers; but as Boece says, that Agricola fortified this place, we must leave it in doubt. On the most northern of these "Govane" Hills certainly there are the foundations of a real British round castle on a mound now called "Murdoch's Knowe or Hurly Haaky." As for the walls of it, few note their presence, under the thick grassy turf; for they have been cut through and thrown out of all shape, in the construction of modern walks, though a practised eye can easily discern the lines of both its inner and outer walls, and at the distance of half a mile, the outline of the hill reveals the contour of an ancient castle, in the levelled top, terraced ground, &c. The area of this fort had been 50 feet in diameter, the inner wall appears to have been 20 feet thick, the outer one probably about 7 feet thick with a distance between

the walls of about 35 feet. The walls have been of red sandstone, and as they rest on basalt it makes the line of distinction very marked. In more modern times this place was used as a court of justice (or shall we say injustice), for here it was that in one day Duncan the aged Earl of Levenax, with his son-in-law Murdoc, Duke of Albany, and Walter and Alexander Stewart, sons of the Duke, by Duncan's daughter, were beheaded in 1425. Sir Walter Scott in his "Lady of the Lake" apostrophises it as "Fatal mound that oft hath heard the death axe sound." This mound overhangs and commands the modern bridges of Stirling; but it ought to be remembered (and by historians is seldom remembered) that in the days when men dealt death to their fellowmen by axes and arrows of stone, and built themselves round castles they did not cross the Aven Dhu at that place.

GARGUNNOCK.

Five miles west from Stirling, near to the old rural village of Gargunnock, we find the Kier of Gargunnock. In the first syllable of the name of this place we have no doubt "Caer," and in the last, knock, knoll, or hill-castle, and hill. The "knock" on which the round fort or kier is built is a conically shaped rock of the very reddest sandstone, soft and damp. The ancient Castle builders were too wise to use it for their masonry, so they brought all the stones for their work from a stratum of basaltic rock about a mile up the steep mountain side. The circumstance of the basalt being used in the construction of the kier, makes it very easy even now, when much of their material is removed to tell with certainty that those walls had once been great; for on either side there flows a mountain stream whose bed is filled with the large columns of basalt, of which they had been formed; the modern bridge in the village also appears to be built from out its material. It seems to have had three circular walls, of which the central is somewhat oval; besides these defences there had been both on the north and south sides, a moat filled with water from the two streams which pass close by it on the east and west. This Castle stands on ground slightly elevated, having steep rocky sides, but the next fort we have to mention is quite down on the plain, and owed all its strength to its water surrouudings; it is called "The Peel of Gargunnock." A small stream runs on the east side of this place, another on the west; on the north is the river Forth, so that there needed

but a moat on the south to make an island of the place, and no doubt such it had been as its name indicates for "Peel" and pool are the same in signification, and here it may be added that "pol" and "pow" (sounded "poo") are all modifications of the same word, and that word abounds in all the valley of the Forth. Will it be found true that the border "peels" all had moats round them? Of the stone defences of the Gargunnock "peel," there remains only a portion of one wall; it has fared peculiarly ill with this antiquity, as in recent times both a high road and railway have been carried right through its site. In blind Harry's "Wallace" we find that this place was garrisoned by English, and that Wallace surprised and took it and them, which event brings down its history to times too modern for these notes.

KIPPEN.

Five miles west in the valley from Gargunnock, at the village of Kippen is the "Keir of Kippen." Its situation is not high, perhaps not a hundered feet above the plain and River Forth. On the east side is a deep glen with a pretty mountain stream, running and leaping over falls as it passes through its precipitous banks under the walls of the "Keir." The centre of this Castle is about 90 feet in diameter: part of one wall only remains, and that is about 12 feet broad. There is some cause to believe that it may have once had the usual three walls, as the bridge across the stream, and also many road-side walls, appear to have been built out of its material. The other four stone circles in this parish have had the fortune to be mentioned in the writings of several antiquaries, but have little claim to such notice. The one is 30 feet in diameter, may have been a *strength*, but the others are mere—perhaps rather modern—houses. A Tumulus called the "Fairy Knowe" near the line of railway was lately opened. Inside were found "an auld can" and some coins. At Kippen the valley is closed in by mountain ranges meeting together, and its "Keir" is the furthest west of the Castles, on its south side. We shall now pass over to the north side and there right across the plain from Kippen is Benledi on whose giant roots are the first of what might be termed the third line of defences to the north of the Roman Wall.

BOCHASTELL.

Bochastell is in the parish of Callander about two

miles west from the village of that name, and there on a spur of Benledi called "the Dune of Bochastell" is this stronghold. This Dune is probably 600 feet above Loch Vennacher, which lies close below. The summit of this hill is artificially flattened, and forms a perfect circle in diameter 85 feet. The one half of its circumference has a perpendicular precipice for its very sure defence, and the other which is almost a precipice is made strong by five walls, all of which, with exception of the outer one, are more than 10 feet broad, and that outer or fifth wall is four feet in thickness. The distance between the top of the first wall and the top of the second is 30 feet; between the second and third walls 25 feet, and between the third and fourth is 15 feet, the average height of each being about 20 feet. On The north side of the Castle it takes a circular sweep round a lower hill, which in a military point of view is dangerously near to the Bochastell. The diameter of this circular outwork is 115 feet. Close to the place where all the walls approach the perpendicular cliff there is a gap or cut right through all of them, except this fifth one, and in this gap no doubt had been the entrance to the building. All the walls are built of sandstone as is the rock on which they rest, but they are now so covered with thick green turf that it is usual to hear them spoken of as earthworks. A moments reflection would teach any one the impossibility of such being the case, for there is no soil on this lofty steep out of which to build them. In the inner circle is a fine spring of water —a rather peculiar place for one, at times it wells up so as to make a pretty round pool on the top of this cliff. The view from this "Dune" is very noble. Far below are the Teith and Loch Vennacher on the south, to the north are Benledi and the fine mountain "Pass of Leny," leading on to Stratheyre. Westward we see all down the Vale of Teith to Stirling, Linlithgow and Edinburgh. A fitting place surely this for a "Bale Fire." The name Bocastle is now attached to the humble homestead on the medow below; the once famous fortress is well-nigh forgotten, and so little, indeed, is it known that even the careful Burton, in his "History of Scotland" has called it a Roman Fort. To see it is to know that it is *our own*. Sometimes we hear regret expressed that on these structures we find no inscription to tell the story of their builders; but are not the buildings themselves an inscription recording that they were no wandering

hordes, but a sturdy people; saying "This land is ours and we will hold it." About four miles eastward from this castle had once stood a much larger one. Its site is on the farm of Auchinlaich, on an eminence a few hundred yards south from the Bridge of Bracklinn, and on the west bank of the Kelty river. There remains little to indicate its presence save the levelling of the top of the hill and a slight appearance of what was once a rampart and ditch. This place is mentioned in the old statistical account of the parish of Callander. The area of the fort must have much exceeded 100 feet.

COLDOCH.

About seven miles further east on the estate of Coldoch, near Doune there are the notable remains of a round house. Some years ago we heard that a Roman well was there, in form of a vaulted chamber. On visiting the place, it was at once evident that it was not Roman, neither was it a "well"—for no water was possible in the situation—but assuredly British work. On carefully surveying the surroundings we came to the conclusion that it was no complete structure but simply a fragment of a true Broch, all whose parts were thoroughly hidden under the turf and walks of the pleasure ground. Many antiquaries had walked over its site, but none had even conjectured what lay beneath. We reported the above opinion to our friend the late Sir James Simpson, who, as president, induced the Antiquarian Society of Edinburgh to send out one of their number to investigate; on digging the Broch was found just as we had indicated. He is chronicled by the society as the discoverer, while the writer of these notes was completely ignored. Built of stone, its masonry is rude, all the lines of it being very irregular, and the stones small. The entrance to the house is the feature of greatest interest, as it serves to explain the form which is found in the entrances of other castles such as the Tappoch, where there is this sort of enlargement in the passage, but not the great stone door to explain its use. The door is placed in the centre of the 19 feet broad wall, where it has the strength of this great mass of stones, This entrance way is 2½ feet wide. There is a passage and ascending stair similar to the one already mentioned as in the Tappoch. The central chamber is about 25 feet in diameter, and from it enters three very small chambers in the wall, only one of which is roofed, the one that was supposed to be the "Roman well."

Its existence came to be known simply by a tree, whose roots, in course of growth, burst its masonry. The site of this round house is on that formerly mentioned ancient sea beach which surrounds so large a portion of this valley, and is so well fitted for such a purpose. In old times there were six Dunes or Brochs on the stretch of country between Coldoch and Lecropt. Their names were—Auchinsalt, Torland, Balmackader, Tor, and Kier. The last mentioned probably stood on the place now occupied by the old churchyard, as the steep declivity on either side of it, and the water supply of the burn below, befit the site of such a building. Dune, Law, and Kier are words that each denote ancient structures. The last of these is to be found in many places of our land, and singularly enough, still more frequently in Palestine. We find mention made of many such in Holy Writ. For instance, Kirgath-Jearim, Kirjath Arba, and the "Palestine Exploration" writers give us a list of many scores of ruined "Kirs" throughout that land, the word being pronounced *Kier*. Doune (Dune) no doubt had once, where its castle now stands, a more ancient fortress, but the name is all that remains to bespeak it. About half-a-mile east from Doune is a round site preserved by fine pine trees, and north from that place, on the farm of Glenhead, is a cluster of four "standing stones," one of those having on it some cup-markings. On the same farm, when levelling a mound with the view of ploughing the field more easily, there were discovered several stone cists, and in one of these was found an urn of burnt clay, and also a stone hammer of a peculiarly hard stratified gneiss, nearly black in colour, highly polished on the surface. Stone of the sort abounds in the neighbourhood. Here is also a monolith of great size; also an earth work an exact square of 100 feet diameter; lately it stood 4 feet high, like a great table, but by the frequent run of the plough is now almost effaced. No doubt it was a Roman work, and is on the line of way we have pointed out, as that which the Romans probably took on their march to the camp at Ardoch. Three miles further east, on the heights to the north of Bridge of Allan, there is an artificial mound about 50 feet in diameter. It has been opened and pronounced to be a tomb, but the view from the place is so wide and useful in a military sense that one might rather suppose it was a look-out for the living. Still farther east two miles we meet with the Abbey Craig and its "Wallace

Camp." The central area has been of oval form, a precipice protecting about one-half (the western half of its outline); the other is on ground sloping very steeply to the east, and on that side it has had a double wall, part of the inner wall is still about 10 feet high, and probably twice as broad. Most unfortunately it is thoroughly buried among the débris of the modern Wallace Monument. A good way down the slope is a second stone wall, which is now covered by a walk; the whole state of this interesting antiquity is a reproach to our patriotism! To the north and east of the Abbey Craig is the Ochil range of hills, and on that one called Castle Law, a part of Demyat, there are the remains of a large round Castle. The centre area is an oval 85 by 55 feet in extent. The wall around this part is quite complete as a line of stones, but is now as low as the turf in many places, and is nowhere more than 2 feet high and four feet broad. Outside of this wall are three others having about 30 feet of distance between each of them. The fragments of these walls now remaining lie on the declivity of the hill in fan-shaped heaps on the site of the several walls, but owing to the extreme steepness of the ground, they are also scattered over the intervening spaces. Still the original lines of each of the walls are easily traceable. The precipitous form of this hill makes the dispersion of the material of the Castle a consequence of the laws of Nature, but besides this, there is here another cause of dilapidation, for nothing is more common than to see the idler rolling its stones over the cliff, and then with eager delight watching their progress as they bound down the sides of the mighty precipice which surrounds this "Castle in the air." The height on which it stands must exceed 1000 feet. The Castle Law is of basaltic formation. The fort is built of the same stone, and where they are so built, the walls are seldom so broad or massive as when formed of sandstone.

TILLICOULTRY CASTLE.

On the front of the same Ochil range, about 6 miles further east, in the parish of Tillicoultry, and on the hill overlooking the glen of that name, there are vestiges of another round castle. It has had 3 concentrically circular walls, with about 25 feet between each. The central circle was probably 80 feet in diameter. The desolation of this place is almost complete, all the usable stones of the structure having been removed to build sheepfolds,

and the square walls of those folds may be seen traced within the bounds of the original circular ones of the ancient castle. Only the poorest *débris* of the materials of these walls now remains, and yet so recent is the destruction come upon them that aged people in the village tell they remember when in their childhood much of the building had a roof of stone. They could not describe the manner or extent of it, but that "it was fine fun to play in Johnnie Mool's hole," the name which the aged people gave to the place. The rock on which the fortress occurs seems to be about 400 feet high, and is so singularly steep, that in many parts of the ascent to it the way has to be formed by long wooden stairs. The view from the top of the castle hill has in it almost every feature that goes to constitute fine scenery. The wild, deep, rugged glen, the lofty mountain (2700 feet high), the far-stretching valley, the glittering winding river, the distant sea, all make up a scene of rarest beauty. But it is true of each of the sites of the castles mentioned in these notes, that the view to be obtained from it would (though there were no antiquities on them) be sufficient reward to every visitor. It cannot be doubted that 2000, or even 1000 years ago the Carse of Stirling or Forth valley was an uninhabitable swamp, for nowhere upon it do we find remains either of castles or of villages. Indeed up to this day there are no villages on the plain, and until very recent times fever and ague so abounded there as to furnish very sufficient reason why none but the farmers of the soil should be willing to live upon it. They and "Will o' Wisp" had it all to themselves, all the villages were placed a good way up on the roots of the surrounding ranges of hills on either side of it, and the roads hobbled along over the rough ground at their bases; in truth, over the whole plain it is everywhere easier to find the remains of colonies of oysters than of men. On the characteristic features of Broch and hill fort architecture, we shall not at present speak, as it is feared that this paper has already attained a wearisome length; but that subject is a useful one. It may be observed that we have not treated of either the baronial or ecclesiastical antiquities of the district, though they form a most interesting class, and it is hoped these will be taken up by some other members of our society.

The monthly meeting was held in the Smith Institute on Thursday evening, 21st Feb. There

was a large attendance of members. After the minutes of the last meeting had been read and approved of, a very interesting paper on "Spurious Ballad Poetry" was read by Mr James Todd, Craigs School. A warm discussion followed. Mr Robert Kidston, F.G.S., read a short note on a plant-bed at Todholes, Earl's Moor, Bannockburn, as follows:— On a geological excursion to Todholes about eighteen months ago, some plant-beds were discovered on the south-east side of the stream, about 400 yards above the bridge that crosses the burn immediately below Todholes. At that time we were unable to examine them carefully, but on a second visit made at the end of last year, we spent some hours in an attempt to ascertain their contents. Only three species were determinable:—*Lepidodendron veltheimianum*, Sternb.; *Stigmaria ficoides*, Brongt. (probably the root of the former plant); and *Asterocalamites scrobiculatus* Schloth. sp. (*Bornia radiata*, Bungt. sp.). Of this last species we only collected one specimen, and that was got on our previous visit. The matrix in which the plants occur is not favourable for the preservation of delicate species. The Lepidodendron occurs in a bed of hard sandstone, and the only chance is getting specimens exposed on weathered surfaces. Those we got were in some *debris*. We were not so fortunate as to find them in *situ*, but there is no doubt they came from one of two beds of similar sandstone in the cliff above. Further up the stream a specimen of *Pinna flabelliformis*, Mart, was found, which has not been recorded before, from this locality." Votes of thanks to the chairman, Mr Croall, Mr Todd, and Mr Kidston, terminated the proceedings.

The monthly meeting of the above Society was held in the Smith Institute on the evening of Thursday the 6th March—Mr Croall presiding. There was a very meagre attendance. After minutes of meeting had been read by the Secretary, the Chairman introduced the Rev. Mr MacIntyre, Greenloaning, who read a paper on "The British Kingdom of Strathclyde." On the motion of the Rev. J. E. H. Thomson, seconded by Mr W. B. Cook, a hearty vote of thanks was passed to Mr MacIntyre for his interesting paper. It was intimated that on Thursday, 3d April, the syllabus would be departed from, as a public meeting was to be held on that date, under the auspices of the Society, to be addressed by Mr Charles Stewart, Killin. The subject of the lecture will, we understand, be "The Early Celtic

Church." Further arrangements will be advertised. This concluded the business. The exhibits were a specimen of long-eared bat and a pot of fungus *(spcerobolus stellatus)* propagated by Mr G. M'Dougal under rather strange conditions. A pot of sawdust, in which fern spores were sown, was left unattended for two or three years, and during six months of that time was shut up in a frame. On being found, it was discovered to be filled with the fungus. The following is Mr MacIntyre's paper :—

A SKETCH OF THE ROMANISED BRITONS OF THE KINGDOM OF STRATHCLYDE.

Mr Macintyre began his lecture by referring to the first peopling of Europe by three great immigrations from the east probably by the narrow way of the Hellespont with considerable intervals of time between them, the Celts, the Goths, and the Slavonians. The Celts have their existing representatives more or less mixed in the Highlands of Scotland, the Welsh, the Irish, the French, and the Spaniards. The Gothic or Teutonic have theirs, speaking generally, among the Germans, Dutch, Danes, and Norwegians, while the Slavonians have theirs among the Russians and Tartars in the north-east of Europe. Of these different races unquestionably the first in the order of time was the Celts. Herodotus, a Greek historian, who lived above 2300 years ago, speaks of the whole of Western Europe being occupied by their tribes. On the question how long previously they had formed a settlement in this extensive part of the earth, ancient history sheds a very imperfect light. But that they had proceeded from the teeming east in an age long anterior seems to be a settled point beyond all contradiction. The Pelasgi, believed to have been of Celtic origin, had possession of Latium before Æneas and the remains of Troy touched the Lavinian shores. We read in the 10th chapter of the book of Genesis that by the sons of Japheth "were the isles of the Gentiles divided in their lands," a general expression denoting the isles of Greece and parts of Europe, because they appeared lying beyond the Great Sea or Mediterranean, and that they went out "every one after his tongue, after their families in their nations," intimating conclusively that they migrated in an orderly and collective condition as determined by the relationships of kindred affinity and language, and the posterity of Javan, the fourth son of Japheth, seem to

have been the first colonists of Europe. It is worthy of notice that Greece is called *Javan* in the Hebrew scriptures, and that the names of two of his sons, Elishah and Dodanim may be recognised in the names of two of its most ancient cities, Elis and Dodona, settlements which had an existence at least nine centuries after the Flood. In these remote times, we are informed Greece had no permanent inhabitants, there were continual removes, the stronger influx always dispossessing the weaker settlers, pushing them further on like wave succeeding wave of the sea to the shore; or the more hardy and adventurous tribes striking out of their own accord for themselves into the vast unexplored primitive wilderness, somewhat perhaps after the fashion of bodies of men and families passing westward in the backwoods of America at the present time. The earliest inhabitants of Scotland, of whom anything at least is now known, were Celts, and the same race was diffused over the whole of England and Ireland. They were divided into many distinct tribes, but were the same in race, spoke the same language, observed the same forms of worship, and were distinguished by the same manners and customs. Ptolemy, a geographer of Alexandria in Egypt, who lived only some sixty years after the invasion of Scotland by Agricola, and had therefore much better means of ascertaining the truth on the point, informs us that the whole inhabitants of North Britain were divided into twenty-one tribes, of which he gives the names, and that they were connected by little more of alliance than a common origin. Five of these tribes soon came to be reduced by the Roman arms into permanent subjection, and henceforward were styled Romanised Britons, while the other sixteen maintained on the whole a general independence, and were subsequently known as the Caledonians and Picts. The Romanised Britons formed the Roman province of Valentia, a territory which included that portion of country bounded on the north by the wall of Antonine, and that on the south by that of Adrian, though in later times subject to various changes after the withdrawal of the Roman powers from the island, the inhabitants, being then left to their own means of defence. The tribes thus left to their own resources consisted of the *Ottadini*, occupying the east coast from the Tyne to the Forth; the *Gadeni*, the central parts; and the *Selgovae*, inhabiting what is now known as the shires of Dumfries and Kirkcudbright; the *Novantes*, Wigtonshire, and the

powerful tribe of the *Damnii*, all Ayrshire, Renfrew and Stirlingshires, with parts of those of Lanark and Dumbarton. This people, from the general adoption of Roman laws and manners, had become to a large degree orderly, civilised, and intelligent, and received the distinction of "Romanised Britons," and having formed a mutual alliance, they established their capital at Alcluyd, "the high rock of the Clyde," and called in later times Dunbriton or Dumbarton, "the citadel of the Britons." This kingdom of Strathclyde or Cumbria, as it is sometimes called, seemed formed by nature and art to be a little kingdom by itself, separate from all others by the two great Roman walls on the north and south, and by the German and Atlantic Seas on the east and west. Its inhabitants manfully preserved their territory, and kept united among themselves for the long space of 400 years, attaining a high distinction by their patriotism, skill in the arts, and literature, for Cumbria was the birthplace of the great bards and romance writers of the time, such as Gildas, Merlin, and others. Still it must be admitted that little more than the halo of these names has reached our times, for a great part of the history of this remarkable people has perished, and the little that remains so vibrates between two points of view, that on the one side being but scantily supported by authority, and that on the other plainly romance, that a judicious eye is always required to discriminate fact. And then again, the history of the Romanised Britons is so much mixed with that of their kindred in Wales, as at times makes it difficult to say to which persons and events belong. The people were, in fact, one, and their language one, and it is curious to observe how appelatives and words still in use among us have their etymology in the Welsh only. *Aber* denoting the entrance of one river into another is a purely old British word, as Abernethy where the Nethy joins the Tay, of which the synonymous prefix in Gaelic is *inver*, a striking proof of which is given in an old record quoted in Chalmer's "Caledonia" of a grant of land to the monastery of May by David I. where the land is called "Invermay qui fuit Abermay," showing the Gaelic had superseded the old Celtic or British. So *caer* signifying a fortress usually shortened into *car* as a prefix to names of towns as may be seen in gazetteers as Carlisle, Carluke, etc. It is curious also to observe how the primitive pronunciation of certain words is retained among the humbler uneducated classes notwithstanding changes in the

orthography as clwt (cloot) for clout, gwn (goon) for gown, etc. The second of the Kings of Strathclyde of whom anything worthy of notice has come down to our times was Coila or Coilus the reputed brother of Gildas the historian and poet, and who reigned about the year A.D. 500. He seems to have been in some way closely connected with Ayrshire where according to the tradition of the people he died. The middle division of the county bears his name Kyle, a part of the country frequently alluded to, as some of you may know by the poet Burns. He was himself a man of Kyle as he tells us in one of his best poems, being born there.

> "'Twas in that place of Scotland's isle
> That bears the name o' Auld King Coil."

Several localities within a little distance of each other have *coil* as a part of their names, as Coylton, Coilsholm, and Coilsfield, the latter a seat of the Earls of Eglinton, but better known as the Castle of Montgomery, so named in that exquisitely touching dirge on Mary Campbell a domestic servant there to whom Burns was tenderly attached, and who died in Greenock on her way to Campbelltown to prepare for their intended marriage.

> "Ye banks and braes, and streams around
> The castle o' Montgomery,
> Green be your woods, and fair your flowers,
> Your waters never drumlie!
> There simmers first unfauld their robes,
> And there the langest tarry;
> For there I took the last fareweel
> O' my dear Highland Mary.

In the neighbourhood of Coilsfield House there is a circular mound of earth which the people have long regarded as the burial place of King Coil. At the close of last century Colonel Montgomery, afterwards Lord Eglinton, anxious to know the contents, caused the mound to be opened, when there was disclosed a cist with an earthen urn, the latter having many of these mysterious artificial cup-like depressions, surrounded by one or more concentric circles that have been found over the country, the import of which archæologists have laboured much, but hitherto in vain, to decipher. A fac-simile of the urn may be seen in Sir James Y. Simpson's volume of "Archaic Sculptures." The third of the Kings of Strathclyde, as he is regarded by many, though born in Cornwall, was the world-renowned Prince Arthur, whose valour and achievements, as related in old legends, partake so much of the marvellous that one scarcely knows whether to

apportion a large part to history or romance. However, making much allowance for the fables of poets and the partiality of admiring subjects, this much seems tolerably certain, that the valour of the Britons was never more conspicuously displayed nor more successfully exerted than under this "head of Kings," as he was styled. At his accession to rule, the people were sunk in the most abject debasement, in consequence of their long dependance on the Romans and subjection to them, and they accordingly presented but a feeble resistance to the encroachments of their enemies on their territories. The Britons were constantly beaten and disheartened, the flower of their armies was cut to pieces, and their hope of maintaining their independence all but entirely extinguished. In this calamitous state of affairs, we are told, young Prince Arthur got the command, and by his wisdom and bravery speedily converted the disorderly levies into well disciplined and formidable armies. A new spirit was diffused among the tribes, the youth crowded round the standard of their chief, and the troops lately beaten and disheartened, became animated with confidence and enthusiasm, and carried victory on the point of their spears wherever they marched. His eleventh and last great battle was fought, it is supposed, near Edinburgh, and the memorial of it at the present day may be seen, it is said, in Arthur's Seat, formerly called *Assuet*, and still presenting the outline of the figure on its summit of a couching lion,—a fitting emblem of the readiness of Scotland at any time to spring on the invaders of its soil. From Prince Arthur also an ancient name of Dumbarton Castle, was *Castrum Arthuri*. To suppress all precedence among his chiefs in Council, he devised the famous *Round Table*, a relic of which some think still exists at Stirling on the west side of its Castle, and going by the name of the "King's Knot." At least old William of Worcester has in his "Itinerary" the words—"*Rex Arthurus custodiebat le round-table in castro de Styrlying, aliter Snowdon west castell*," "the King Arthur kept the round-table in the Castle of Stirling, otherwise called Snowdon west-Castle." We know that *Snowdon*, meaning "the citadel beside the river," was a former name of Stirling from good old Sir David Lindsay, who trained there James V. to "deedis martiale," telling the boy king "antique stories," as he says—

"Of Hector, Arthur, and gentle Julius,
Of Alexander and worthy Pompeius,"

for in one of his poems, the "Complaynt of the Papingo," he represents her as saying—

> "Adieu! fair Snowdon, with thy towris hie,
> Thy chapell royall, park, and table round."

The great Prince Arthur died in England fighting the deadly enemies of his people the Saxons there, from whom he received his death wound, and was buried at Glastonbury. Some 700 years after, his tomb was opened at the desire of Henry II., and his body found in a coffin hollowed out of a large trunk of oak, and beside it lay the remains of his faithful wife Guenever, her long yellow hair beautifully braided and ornamented with exquisite art. To preserve his subjects from the grief of despair by the tidings of his death, the report was circulated that he was only wounded, and given over for a time to Morgain Lalaye, a nymph of the woods, and supernaturally skilled in the art of medicaments and healing in the isle of Avalon or The Blessed far out among the waves of the ocean,

> "Where falls not hail, or rain, or any snow,
> Nor ever wind blows loudly."

and that he would soon return. So say old legends. Long, long and wearily was the expectation cherished by the Britons who amid all their sore struggles with their foes on every side allowed themselves to draw comfort from the promise and prospect. But Prince Arthur the flower of Kings never came back to Strathclyde. I wish I could tell you more of this little Kingdom seemingly so admirably bounded by nature and Roman skill, and inhabited by so brave and polished a people, but it were a sad story. The star of their fortunes had reached its highest elevation under Prince Arthur, and, with his death it began to sink among clouds, shooting forth now and then only a brilliant but passing gleam through the darkness of the long night that followed till it finally disappeared to the world. Assailed often on their north border by their unnatural inveterate enemies the Picts, and on their east, south, and west borders by the Saxons and Dalriad Scots, the two latter recent but powerful foes, and not infrequently plundered by sudden invasions of the Norsemen, those terrible bands of sea-rovers that like flocks of wild sea-birds descended on their shores, they maintained the unequal contest for the long space of well nigh 400 years, till reduced to a narrow strip of territory extending on the west coast from the Clyde to the Solway, the rest being taken possession of by the Saxons, they became extinct as a nation on the gory field of Vacornar

in A.D. 975 when Dunwallon their gallant Prince withdrew and retired to Rome where he assumed the cowl of the monk when he could no longer wear the diadem, for he disdained to be a subject and tributory. But well-nigh 100 years before, I find that a large portion of the people seeing the dark day was surely coming, abandoned their fields and orchards in Clydesdale, and setting out in a body fought their way to their kindred in North Wales and settled down among them, and in the valley of Clyde in that principality, one writer remarks, the descendants of those emigrants may even at the present day be found, distinguishable from the rest of the inhabitants by a greater tallness of person, longer visages, and some peculiarities in speech. In A.D. 843, Kenneth, son of Alpine, is found reigning over both Scots and Picts at Scone, and such of the Scandinavians as had settled among them, and the name of Pict passes away and that of Scot is written in its stead, and forty-five years after the fatal field of Vacornar the Saxons of Lothian, with such of the Romanised Britons as existed in Strathclyde, were annexed to the Scottish crown, the different nationalities forming one kingdom—Scotland. You will thus see we, as a people, are sprung from different races, happily blended together with the best qualities of each, the unyielding perseverance which distinguished the Saxon, the fearless daring and love of the sea which characterised the old Norsemen, the fire of the Gael, and I may add, the chivalrous bearing of the Norman. And

"Thank God we are one people,"
With but one heart, one aim,
For our bosom hath a warmer pulse,
To hear old Scotland's name."

A public meeting under the auspices of the Stirling Natural History and Archæological Society was held in the Smith Institute on the evening of Thursday the 3d April—Mr Croall presiding. As the concert in aid of the funds of the Royal Infirmary had been unfortunately fixed for the same night, the attendance was not so large as could have been wished. The minutes of March meeting having been read by Mr David Chrystal, secretary, Mr Croall in appropriate terms introduced Charles Stewart, Esq., Tigh'n-Duin, Killin, who read a very interesting paper on "The Ancient Gaelic Church." At the close, the Chairman said he was sure all present had been highly gratified and much in-

structed by Mr Stewart's admirable lecture, and should any one wish further information on the subject, this, no doubt, Mr Stewart would kindly supply. Mr Fergusson, Raploch, accordingly begged to know the meaning of the word "Culdees," which Mr Stewart explained was the English form of the Gaelic "*culgich*," from *cul*—a nook or dark recess; and *gich*—a worshipper. The Rev. Mr Goldie moved a very hearty vote of thanks to Mr Stewart, which was seconded by the Rev. Mr Ormond, who said that Mr Stewart had gone about his investigations in true historical spirit, discarding modern authorities, and going back to ancient records. He was much pleased with the concluding portion of the lecture, and could cordially agree with all that Mr Stewart had said, especially in his remarks about chanting. The ancient Hebrews chanted their psalms, and in commending the practice, Mr Stewart had done us service. He had much pleasure in seconding Mr Goldie's motion, which was therefore carried. Mr Stewart, in reply, thanked all present for the kind attention with which they had listened to his remarks. With regard to chanting, there could be no question that the ancient Hebrew form was precisely the same as that practised by every Gaelic minister, the metrical and not the prose version of the psalms being used in both cases. In Gaelic great attention was paid to enunciation, as it was essential to Gaelic poetry that the words should be given with their appropriate place and enunciation. Mr D. Chrystal, secretary, then announced that the Council had resolved to form, for the public good, a complete collection illustrative of the natural history and archæology of the district. The Trustees of the Macfarlane Museum had handed over their collection of antiquarian relics to the custody of the Council, and that would go to form the nucleus of the archæological part of the Museum, and the Trustees of the Smith Institute had granted —the legal formalities had almost been completed —the exclusive use of the smaller museum to contain the collection. That was to say, the museum, in which they were at present assembled, would be cleared of its contents, to make way for the cases, &c., of the new collection. For the purpose of carrying out the matter in a thorough and satisfactory manner, it would be necessary to raise a sum of about £200, and the Council proposed shortly to set about obtaining that sum. He desired it to be clearly understood that the collec-

tion was not for the benefit of the society, in which case they would not be entitled to appeal for public support; but the work had been undertaken by the Council because they thought a society such as their's was, had the best opportunity or was best fitted, to carry the matter to a successful issue. Further particulars would shortly be announced, but in the meantime every member of the society could aid by giving the project the widest possible publicity. Mr Croall and Mr Hutchison spoke in support of the scheme, the latter gentlemen suggesting that in the raising of the necessary funds they might be materially aided by the lady members of the association. This suggestion was, however, promptly negatived by Miss M'Lagan, Ravenscroft, who thought that until lady members of the society were placeed upon the same footing as gentlemen, they had no right to be appealed to for assistance. A vote of thanks to the chairman, concluded the business. The following is Mr Stewart's paper:—

There are two types of churchisms, the *sacerdotal* and *non-sacerdotal*; and in ancient Scotland, north of the Forth, we had in early times a representative of each. I have used the word sacerdotal purposely, as Bishop is such an elastic word, and used so very differently; in the New Testament it means the same office as Presbyter. It has, however, a very different meaning when used in a sacerdotal connection. Then it means that a priest ordained by *jure divino* Bishops, has in virtue of that ordination powers beyond the natural conferred on him, and which enable him to give regeneration in baptism, remission of sins, following upon confession, and such-like miraculously spiritual gifts. Non-sacerdotalism means the very opposite, for whilst strongly affirming that the ministerial office is the highest that man can aspire to, it totally denies such supernal powers. Now in early times Scotland had as already stated a church of each of these types. But for the thorough understanding of this, we must bear in mind that north of the Forth there were three kingdoms, all Gaelic speaking, viz:—A northern Pictish kingdom, whose capital was Inverness, an eastern Pictish, extending from Drumalbin to the east sea, and a Gaelic or Scotic in the west from Drumalbin to the west sea. The northern Pictish remained heathen to the time of St Columba. The eastern had a southern colony in Galloway, and it was from thence it received its Christianity. In 398, St Ninian, a Roman Catholic, set up a church and mission at Whithorn, and from thence his

missionaries propagated the Christian faith in its Roman and sacerdotal form through eastern Pictland. We now come to the special subject of this lecture, and that is, what was that Celtic Church which prevailed in the Gaelic kingdom, and where did it come from. It came as we are told from England. At an early age, Christianity, before it was corrupted by after additions, was brought to England. About the end of the third and beginning of the fourth century, a violent persecution by Diocletian broke out against these Christians, and according to the tradition of the Gaelic kingdom, many of the persecuted fled there, and converted them to the faith in its primitive and non-sacerdotal form. This is confirmed by subsequent events. In the fifth century we find from Prosper Aquitanus that Palladius, a Roman Catholic, was sent by the Pope to the Scots of Scotland to bring them over from the Celtic to the Roman Catholic form of faith, but without success. It has been strongly urged that he was sent to Ireland and not Scotland. Most distinctly, however, do the words bear that he was sent to the *Roman Island*, which it is impossible to interpret as meaning Ireland, which in no sense was such. We can trace Palladius' journey from eastern Pictland, as he passed onward to the west coast, by the names of places. Thus we have in Glenlyon *Cathair-Pheildy*, that is Paldy's seat or resting place, and close to it *Eas-Pheildy*, or his waterfall. The word Cathair gives a most interesting confirmation, as it is a British and Pictish word, but not a Scotic one. From which it is evident that Palladius and his followers named it in their own Gaelic, but which the Scots retained, although quite contrary to their usage. In 563 we come to another era in the Celtic Church; but in order to apprehend aright, we must bear in mind that there was in the east of Ireland a Scotic or Gaelic Kingdom, which was in terms of the utmost affinity to the Scotch Gaelic Kingdom. The Celtic Church also in them was the same, so that what was true of the one was true of the other. At that date, then, St Columba sailed from Ireland with twelve followers, and landing on Iona established there that monastery so celebrated in Scottish Church history. Now, it is quite evident that he came not to a heathen country, but to a country already Christian, for the purpose of reviving and strengthening its faith. It was quite different when he went to northern Pictland, for there he found a heathendom which he

converted to Christianity. He was succeeded by a series of Celtic Church Abbots until the time of Adamnan, who adopted Roman Catholicism. The next era in this Church took place in 710. How it happened we cannot tell, but at that time, Iona had passed from the Scots to the Picts. Naitan, the then Pictish King, was a Roman Catholic, and put forth all his energies to drive the Celtic churchmen into Romanism. Seven years later when these efforts had proved ineffectual, he banished them out of the island. In the other parts, however, still under the Gaelic Kings, Celticism remained untouched. After that for several centuries an almost total blank occurs in the history of the Gaelic kingdom and Celtic Church, but still we find on its emerging into the light of day in the 11th century, that it is still the same non-sacerdotal Church. We now come to the last sad era in our Church. In an evil day Malcom Ceanmore married Margaret of England, who was a bigotted Roman Catholic and totally priest-ridden. Under her tutorage, Malcom commenced the supercession and persecution of the Celtic Church, a system which was continued by his successors until some centuries later it was outwardly extinguished. Its tenets, however, remained embedded in the hearts of the Gaels, and this, we conceive, explains the rapid progress of the Reformation in the Gaelic kingdom. With regard to the tenets of the Celtic Church, we have some valuable ancient authorities; notably Cummian who succeeded Columba in the Abbacy 657, and wrote his life; Bede, the Roman Catholic historian, who wrote about 730; and Bernard's life of Malachy of the 11th century. Adamnan's life is absolutely worthless as after being appointed Abbot of Iona, he turned Roman Catholic, and wrote Columba's life for the purpose of showing that he was a sacerdotalist of wondrous miraculous powers. That is what of the life is his own, for he quotes Cummian bodily. Such conduct was not singular I am sorry to say. For instance, Jocelin naively tells us that he falsified the old Celtic life of Kentigern for a like purpose. The Celtic Church differed from the Roman Catholic in the following:—First. There were no Episcopally consecrated Bishops in it from its commencement until it was driven into Romanism by Malcom Ceanmore and his successors. We are told indeed that at the request of the Northumbrian King they sent him a Bishop. But then he was ordained by *Presbyters only*, which is the undoubted statement of Bede, and therefore no Bishop in the

sacerdotal sense. In 712 Tighernac relates the death of a Bishop at Iona, but it must be borne in mind that this was after Naitan instituted Romanism there, and that therefore he was a Roman Catholic. It is said there were Bishops in the Irish Celtic Church which was at one with the Scottish Celtic. Well these so-called Bishops were ordained by Presbyters; were inferior to lay Abbots and even women; and existed in such numbers that we for instance find a hundred in one monastery, and so swarming over the country that councils enacted many decrees against them. The Council of Cealcythe in 816, however, has settled the question, by enacting that it was unlawful to let them perform any church offices, as they did not know if they were ordained, seeing that the Scots allow no metropolitan order. This fact is also very evident from a very ancient document, the catalogue of the Saints of Ireland, where it is said that in the first period of the Irish Church there was only one order of clergy. It is pointed out that Bede says that at Iona, contrary to usual custom, Bishops were subject to the Abbot, but it is forgotten that this was written in 730, after Iona became Roman Catholic under the Pictish Kings, at least for a time. These therefore were Roman Catholic Bishops. It is an utter impossibility therefore that there could have been sacerdotal Bishops in that church for at least 800 years, and yet no trace whatever of them. Second. The Celtic Church had a different tonsure, a different rite of baptism, and a different time of keeping Easter. Third. The Celtic Church clergy and even the monks were married. Fourth. They had a different administration of the sacrament, and performed their service in a different part of the church at St Andrews. (See Register of St Andrews.) Fifth. They had no rite of confirmation or penance. (See Bernard's life of Malachy.) And Lastly. They had as their rule of faith *the bible and the bible alone.* (See Bede.) The central figure in the Celtic Church is Columba, who has left his impress broad and deep over the religious life of Scotland, even until now. Leaving Ireland in 563 with twelve companions, he landed at Iona, and founded that monastery which became so celebrated, and from which issued forth a body of missionaries who carried the true faith not only over the Gaelic kingdom but even penetrated into Pictland. Sometimes these missionaries went singly or in two and threes, at other times in considerable numbers. In this case they congregated at a place, hence called a

Discart, and from which they spread over the neighbouring districts, teaching and preaching the truth. Each missionary had a house of his own, consisting of an inner room for worship and an outer for living in. It was probably nothing more than a hut built of wattles, faced with sods, and with a thatched roof. Such a house was known as a *cuile*, and the inhabitant as *Cuildeach*, or the man of the cuile. It is this Gaelic name Cuildeach which has been translated into English, as *Culdee*. Columba's own personalty stands out before us in noble realization. Small in stature, of most commanding presence, and with a holy joy beaming on his face, indicative of the joy and gladness with which the Holy Spirit filled his inmost spirit, and which made him beloved of all who looked upon him. We can see him rising up before us in his daily work at Iona, at one time consoling a penitent, at another caring for the wants of a solitary crane who had wandered away from his native land; again passing through the fields superintending the work and encouraging the workmen; anon in his cell trans-scribing the Psalter; and then passing to the shore to welcome the coming stranger, and entertaining him with the genuine hospitality of the Highland gentleman. The last scene of all is touching. He lay speechless on the floor when Diormit, his beloved attendant, took his head on his knee, and then raising his right hand asked him to bless his monks. This he did by slightly moving his fingers, and then passed into his rest. So died the man who laid on foundations deep and strong, that essential element of individual freedom, independent of king or priest, which to this day characterises alike the Gael and the Lowland Scotchman. I believe that in these times, the times of Ossian (3d century), and Columba (6th), there was a high culture afterwards lost in the dreary decays of feudalism, and I believe there was a high culture in the Celtic Church worship. Much of that worship was the service of praise, and its musical form that of the chant. Columba himself when chanting had a voice sweetly mellow and piano to those near him, whilst at the sametime every word could be distinctly heard at a very long distance. As with the Celtic Church, so with our non-sacerdotal churches now—the service should be cultured. Why should we leave culture to sacerdotalism? I see in the Perthshire Highlands an immense advance in culture amongst our working classes, and can we suppose we can retain their sympathies or stir their

inner beings by an uncultured worship? In fact, many seem unable to distinguish between a symbolic and cultured worship. By symbolic I mean a worship which, passing away from the few simple symbols of the New Testament, and instituting an unwarranted symbolism of its own, becomes an invention, and that an unscriptural invention of man's creating. No one can be more bitterly opposed than I am to the latter, whilst with my whole heart I advocate a culture in no respect contrary to the teachings of the New Testament. Standing at singing, and that singing of the most appropriately best, kneeling at prayer, and when required, instrumental music, I distinctly place in the latter category, and no one dare say I am in the remotest degree a sacerdotalist, but the very reverse. As to chanting, it comes naturally to us Gaels. Our ministers often chant their prayers and sermons, and many of our songs are just chants. This results from the fact that with us the words which convey the meaning contained in them come first, the music second to intensify. All our ancient poetry was thus chanted, and I doubt not but that the Celtic Church utilized these old chants. I will close with an interesting fact. An old friend, now no more, possessed of much Gaelic lore, having called on me, commenced chanting the ancient poetry. I wrote his chant down, got it harmonised in four parts, and set it to "Jerusalem the Golden," and its Gaelic translation by my revered friend the late Dr John MacLeod of Morven, and two Sundays ago it was sung with great zest in church at Killin.

The usual monthly meeting of the Stirling Natural History and Archæological Society, was held in the Smith Institute on the evening of Thursday the 1st May—Mr Croall in the chair. After minutes of former meeting had been read, Mr David Chrystal, secretary, read a recommendation from the Council of the Society that a vote of thanks should be conveyed to Charles Stewart, Esq. of Tighn-Duin, Killin, for his interesting paper on "Ancient Celtic Religion," read at the April meeting. This was unanimously agreed to. It was further recommended by the Council, that a petition from the society, should, in the interests of science, be presented to Parliament through Mr Campbell-Bannerman, member for the Stirling Burghs, in favour of the "Access to Mountains Bill." In the absence of necessary information regarding the provisions of the Bill,

it was moved by Mr Cook, and seconded by Mr R. S. Shearer, that the matter be delayed for a month, and this was agreed to. Mr Croall then introduced Mr Gilbert M'Dougall who read "Notes on the Elateridae or Wire-worms." A short paper was also read by Mr Croall on "Insect Miscellanies" or the history and development of the science of Etymology. Some interesting exhibits were laid before the meeting. These consisted of specimens of new mineral from Caithness, sent by Mr John Gunn, freshwater Algae from Lake of Menteith, by J. Stirling, Esq. of Garden, *tortula Müllerii* from Craigforth, by Mr Sword, Map like fungus on ivy leaf, by Mr Gilbert M'Dougall, *Anemone nemorosa*, from King's Park, by Miss Morrison, *Saxifraga granulata*, from Craigforth, by Mr Sword—and a case of Wire-worms, and their later development as click beetles. A number of very curious old engravings of Stirling were shown, some of which were from Miss Dennistoun Kippen's collection, and others the property of the society. A gold guinea of James II., dated 1686, was also exhibited. It was found on the farm of Mr Watters, Glenample, and was in excellent preservation, having only lost a small fraction of its weight. A vote of thanks to Mr Croall for his conduct in the chair, to Mr M'Dougall for his interesting paper, and to Miss Agnes Brown for preparing the diagrams illustrating Mr M'Dougall's Notes, wound up the proceedings.

NOTES ON ELATERIDÆ.—SUBJECT, WIREWORMS.

(BY GILBERT M'DOUGALL.)

The Wireworms are the larvæ of several species of beetles, commonly called "Click-beetles;" click from the noise they make when leaping up to resume their natural position when they fall, as they often do, upon their backs. They belong to the order *Coleoptera*, from the family *Elateridæ*, the genus *Elater* of Linnæus, and comprise about seventy species indigenous to Britain, four of which form the subject of this paper. But owing to a difference in their structure, they are divided into several genera by modern Naturalists; nevertheless they are true *Elaters* of Linnæus, and will be treated as such in this paper. *Elater ruficandis*, of Gyllan; *E. sputator*, of Olivier; *E. hæmorahoidalis*, of Fabricius; *E. analis*, of Herbst; *Anathrotus ruficandis*, of Dillwyn; and *Athous ruficaudis*, of Eschscholtz; length, six lines; breadth, one and one-half line. They are abundant from April to the end of June in corn fields, on nettles, in woods,

and pastures. *Elater sputator* is the smallest; length, from three to four lines; breadth, from one to one and one-sixth line. From the great difference of colour, this *Elater* was named *E. variabilis* by Herbst, and Paykull named it *E. obscurus*, which is a quite distinct species. To this and the two succeeding species, Eschscholtz gave the generic name *Agriotes*. Such is the diversity of names among authors that a young aspirant after natural history is often left in a maze if he at first studies more than one author. *Elater obscurus*, of Linneaus; *E. variabilis*, of Fabricries; *E. obtusus*, of De Geer; and *Cataphagus obscurus*, of Stephen; length, four and one-fourth to four and one-half lines; breadth, one and one-half to one and two-thirds line. A common insect throughout the country, and may be seen from April to midsummer in fields, pasture lands, woods, and gardens. *Elater lineatus*, of Linnæus; *E. striatus*, of Panzea; and *E. segetis*, of Bierkander, Gyllen; is supposed to be a variety only of *E. obscurus*, with the elytra or wing-cases striped, the spaces between the striæ being alternately light and dark, forming four brown and five testaceous lines. This and the preceding species are the most commonly bred from the larvæ by those who have taken the pains to rear them; therefore these only shall I describe. *E. obscurus* is rather more robust, and the sides ef the thorax are more convex than *E. sputator*; the head and thorax are thickly and distinctly punctured; the latter is as broad as it is long, orbicular, very convex; the posterior angles are produced into strong spines, and there is a channel down the back; scutel oval; elytra not broader than the thorax, and nearly three times as long, elliptical and convex, the extremity when united conical, the apex of each rather acute, reddish brown, and punctured, each have nine punctured striæ, somewhat in pairs; antennæ a little clavate, quite as long as the thorax; basal joint stout, second and third of equal length, shorter and smaller than the following—the terminal one, ovate-conic, reddish brown, as well as the legs; the feet, or tarsi, distinctly five-jointed. The pubescence is so thick on perfect specimens as to give them a dull brown tint all over; whilst others, which are old and rubbed appear blackish. After pairing, the female beetle lays her eggs, but whether in the earth, close to the root of the plant, or between the enveloping leaves or sheaths near the base of the stalk, Curtis was unable to determine; which part of their economy he was very desirous to ascertain.

He says, "Hitherto I have endeavoured in vain to detect a female depositing her eggs, or to find any, except by dissection, whence I have observed them close to the base of the oviduct." The wireworms when hatched are very minute, almost invisible to the eye; they grow slowly; and according to Beirkander, remain five years a worm, casting off their skin thrice probably, like other *larvæ* as they increase in stature. The *exuviæ*, or cast of skin, is brown; and they are supposed to perform this moult like other caterpillars, by splitting the horny skin along the thorax, and drawing themselves out at the aperture, leaving a perfect *exuvia* of every part, including eyes, horns, feet, and it is believed also of the internal organs. Immediately after this extraordinary operation they are very tender, and move little about for a day or two, until their coat becomes hard. The mature wireworm descends a considerable distance into the earth, there to undergo the final change. After forming an oval cell, composed of the surrounding particles of soil, it there casts its skin, and becomes a pupa, or *chrysalis*, generally, at the end of July or beginning of August. Some remain as pupæ, but for two or three weeks, whilst the greater number do not burst from their shroud until the sun has again returned on his upward course; and by his rays all things have emerged into life. Of all the insect enemies with which we have to contend in either garden or field none are more destructive or more difficult to overcome than the wireworm, their economy being favourable to the development. By continually feeding under the surface, any remedial measures we may adopt in the way of insecticides are all but harmless to their existence. It is a well known fact among entomologists, that many insects in their larval state are peculiar to certain species of plants, or at least to a particular order—thus the *Phytoptus ribes* are confined to the black currant, the *Cecidomyia destructor* to corn, or the turnip-fly, *Altica nemorum*, to the *Cruciferæ*. In the wireworms we have it otherwise demonstrated, for they may be almost termed omnivorous, few plants being free from their attacks. They will feed upon corn, grass, turnips, mangel-wurzel, cabbages, and delight to eat into the centre of a potato or carrot, or for change of fare it may be a choice carnation or pansy. Therefore, their range of choice being so ample and continually working under cover, so that a great amount of mischief is done by them before their presence is detected. In gardens under

regular cultivation their presence is seldom observable except when turning the soil, and then it is well to kill all that are seen. Often when digging I have had the Redbreast for a close companion, watching every spade-full as it was turned, and when a young click appeared on the scene, it was amusing to see the daring of Mr Robin to have the dainty morsel. Sometimes when flower beds are surrounded by grass, and especially if the occupants are some of their favourite plants, we may expect a good many blanks unless we keep a watchful eye after their welfare. Whenever a plant is observed to assume a sickly hue, the soil should be gently turned up all round it, and every insect injurious to its well-being instantly killed; after which return the soil and press it firm about the collar of the plant. I know of gardens about Stirling that for a year or two after being brought under cultivation, the crows played sad havoc among the crops. Beans, pease, cabbages, and potatoes, all shared the same fate, being pulled up and left lying on the surface. Master Crow's quick and experienced eye detected the enemy at work, though hid under the surface, and by pulling up the plants several wireworms would adhere to them, and become an easy prey. In one garden I have attended to for several years, I planted, shortly after it had been broken up, a goodly collection of hardy herbaceous plants, but, "wae's me," in two years they dwindled away to a mere bagatelle, until now, there is nothing but the stronger growers left. The more choice and weaker growers were first attacked, and in turning up the soil I have counted as many as two dozen wireworms gnawing away the vitality of one plant, all of which were put "hors de combat." Partly in this manner, and partly by the wireworms being transformed into full-fledged beetles, complete immunity is now enjoyed from their onslaught. In the year 1813, according to Mr Spence, this larva destroyed the greater proportion of the annuals sown in the Botanic Garden of Hull. In such cases, Sir Joseph Banks recommended that slices of potatoes, stuck upon skewers, should be buried near the seeds, and examined from time to time to clear them of the wireworms. That potatoes buried near the surface are a very excellent bait for them, the following extract from a recent writer will show:—"Very early in the year a field was placed under my care as a kind of auxilliary kitchen garden for the cultivation of potatoes and other culinary roots. The soil,

which for many years had been stirred no deeper than about four inches by means of a light one-horse plough, was found to be in a very poor, almost inert condition. A liberal dressing of farmyard manure was carted on to it; it was well stirred and thrown up roughly to a depth of fully nine inches with spades, and in due course about an acre of it was planted with potatoes. Now, neither in digging nor during the planting were many wireworms perceptible, yet, upon examination a short time afterwards, there was hardly a tuber without several wireworms attacking it—some just commencing operations, others, which had burrowed so deeply as only to leave a short portion of their wiry bodies visible, while all with unerring instinct were gathering to the richest feast they had probably met with during their existing. Such an unpleasant occurrence might be regarded either as a serious dilemma or as a capital opportunity of clearing the soil of such a pest, and so saving not only the present but future crops from its ravages. While taking the latter view, the former one, which seemed to point to possible failure, was only felt as a spur to exertion, and a couple of men were immediately set to take up the potatoes one by one with trowels, destroying every wireworm that could be found, and replacing the potatoes in the soil as they went along the rows. It was a long and tedious job, but it was undoubtedly a thorough one, for it was computed that upwards of ten thousand of the enemy were destroyed; and so the battle was gained, the crop proving an excellent one, sound and free from every blemish. By an expensive method at the time, but sound, the writer saved not only his potatoes, but all succeeding crops. It is on the farm, however, that most damage is done by these depredators, where hand picking is attended with difficulty, owing to the extent of ground under tillage; therefore some other mode will require to be adopted to check their ravages. If a field, after it is broken up, is found to be much infested, the proper course to pursue will be to plough and harrow the ground several times, when, by each turning, thousands will be brought to the surface to be devoured by crows, starlings, seamews, &c., who are not long in finding out the rich feast spread for them. I have often when a boy followed the ploughman at work, and watched flocks of crows and of seamews following in his wake, and coming within a few yards of him to pick up all sorts of grubs. Of the two birds as insect devourers,

I would place the seamew in the foremost rank, for he follows the ploughman more assiduously, and is not so timid as the crow, but walks after him from end to end of the furrow as he proceeds with his work. Another point in favour of the seamew is, he takes nothing but what is spread out for him; neither eating corn nor stealing potatoes, whereas the crow has the reputation of being guilty of both. Nevertheless, the form of the bill, combined with the strength and assiduity of the crow, gives him a great advantage over the seamew, and renders him well qualified to be a grub hunter. It is marvellous the amount of labour a flock of them will execute, when they light upon a field. Frequently I have watched large flocks working upon a field of corn or wheat newly braird; neither stone nor clod would be left unturned, and those who fell into the rear would rise and fly to the front to again fall into the rear; thus they would traverse the field two or three times before quiting it. As before mentioned, their experienced eye discovers the foe though unseen, by the traces he leaves behind him in the plants having a sickly hue. Many extracts from Naturalists might be quoted favourable to "Master Crow" as an insect devourer, but this one will suffice. "In the neighbourhood of my native place," writes Mr T. G. Clithero, "in the county of York, is a rookery, belonging to W. Vavasour, Esq. of Weston, in Wharfdale, in which it is estimated that there are 10,000 rooks; that one pound of food a-week is a very moderate allowance for each bird, and that nine-tenths of their food consists of worms, insects, and their larvae; for although they do considerable damage to the fields for a few weeks in seed-time and a few weeks in harvest, particularly in backward seasons, yet a very large proportion of their food, even at these seasons, consists of insects and worms, which (if we except a few acorns and walnuts in autumn) compose at all other times the whole of their subsistance. Here, then, if my data be correct, there is the enormous quantity of 468,000 lbs., or 209 tons of worms, insects, and their larvae, destroyed by the rooks of a single rookery in one year." Pheasants and partridges are likewise exceedingly beneficial to the farmer, and, more than compensate him for any small quantity of grain they do consume, by the amount of insects devoured; for each of their crops are often found full of young slaters, and other larvae. In volume 4, page 814 of the *Gardeners' Chronicle*, Mr Milton of Great Marlborough, writes:—"Found in the crop of a cock

pheasant, in December, 1844, 852 of these larvae" (*Tipula*, or Daddy long-legs);" they were alive, and nothing else was found in the crop, excepting a few oak spangles." Also a correspondent of the *Sporting Magazine*, volume 4, page 45, writes, "that no fewer than 1225 of these destructive larvae (wire-worms?) were taken fron the crop of a hen pheasant in January." No doubt these birds pick out the larvae in corn and turnip fields, and when it is remembered, that the almost incredible numbers contained at one time in the stomach, only made a single meal, the extent of their services may in some measure be estimated. Also, in the crops of lapwings, large quantities of wire-worms have been found, and, as is supposed one bird would pick up the modest sum of one hundred in a day, it will give some idea of what a flock containing sixty or more will do in a season. Curtis after recounting several remedies for exterminating, or checking to a large measure, the farther progress of the wire-worms, says:—"I must confess I think highly of hand-picking; its effects are certain, it is comparatively not expensive, especially when it is borne in mind that it gives employment to the children of the labourer; and where the wire-worms swarm it must be successful, as will soon be demonstrated. What must have been their amount in a field shown to Mr Spence "in which" he says "they had destroyed one-fourth the crop; and the gentleman who showed them to me calculated that his loss by them would be £100. One year he sowed a field thrice with turnips, which were twice wholly, and the third time in great part, cut off by this insect." A striking instance of the use hand-picking appeared in the *West Briton*, a provincial paper, in November, 1838, stating that "Mr G. Pearce of Pennare, Govan, had saved an acre and a-half of turnips, sown to replace wheat destroyed by the wire-worm and attacked by hosts of these larvae, by setting boys to collect them, who at the rate of 1½d per 100, gathered 18,000; as many as fifty having been taken from one turnip. Thus at the expense of £1 2s 6d, an acre and a-half of turnips, worth from £5 to £7, or more, was saved; while, as the boys could each collect six hundred per day, thirty days' employment was given to them at 9d per day, which they would not otherwise have had." "Mr Eley of Heathfield Farm, Hounslow, communicated to me the following statement regarding three acres of wheat (drilled) infested by wireworms, and which were hand-picked by women, in March, 1846:—The

dead plants were dug up with square-pointed knives, and the wireworms picked from the roots into small jugs; at the end of every two rows they were emptied into a large jar, from which escape was impossible. The total quantity taken and destroyed in this manner, from the three acres alone, was more than 60,000; the expense of collecting them was trifling, being not more than 10d per 1000 at which price the women can get good wages. The ground was gone over two or three times, and the worms were counted every night. And in June, 1845, we had five acres of Swedish turnips very much affected by them; a woman was set to dig the plants that were dead and dying, and to pick up the worms; she was 17 days at 1s per day, and collected 41,600 (this quantity is quite correct). The wireworms are much easier caught from the turnips than wheat; as many as 25 in several instances have been found attacking a single plant." The learned Bierkander says "I have made many experiments to discover by what means the wire-worms may be destroyed. Many were put at one time into tea-cups filled with the following vegetables, viz.:—

Garlic, amongst which they lived 9 days.
The leaves of the spruce, do. 14 hours.
The leaves of the fir, do. 10 hours.
Ledum palustre (an Irish plant), do. 9 hours.
Myrica gale, sweet gale, or Dutch myrtle, do. 2 hours.
In water they lived 4 days.

He (Bierkander) then goes on to recommend the mixing of fir leaves, *Ledum palustre*, and sweet gale into the manure heaps, of which vegetables the dung would smell, which might probably be disagreeable to the vermin. Lord Albemarle recommends powdered rape-cake to be used as a manure, and sown across the field. In an artiele which appeared a few years ago in one of the agricultural journals, upon the extermination of wireworm, the writer says:—"The rape-cake should be well pulverised, then scattered broadcast over the land and well raked in. The wireworms are said to eat it to repletion." Since the above statement was penned, I have seen it contradicted by a recent writer, who stated that the fattest and plumpest he ever saw was feeding on rape-cake. As might be supposed, concealed as they are in the earth, the wireworms would escape from insect foes, but such is not their fortune. Curtis, in some wireworms received from a friend, found in one which seemed to be full grown, two or three white maggots, and another

had changed into a nymph or chrysalis, from which he could see it was a hymersopterous insect. This little ichneumon, when full fledged, he was enabled to ascertain to be a *Proctotrupes*. Bierkander records "Nature has, however, furnished allies against this army of vermin, as an ichneumon, by means of its aculeus or egg tube, if I may so call it, insinuates its eggs into many of them, so that in thirty worms which I have taken, I have found six that have been thus quartered upon. From one of these worms, with loss of life of the host, six, ten, thirteen, to twenty guests have come out. Which ichneumon this is, I have not yet discovered, as the pupæ put into jars have all died." And again, "The 14th of June a wireworm drew from its mouth a thread eight inches long." This must have been an intestinal worm, belonging to the genus *Filaria*. There are several records of the interesting fact of similar instances having been observed among various insects in both the larvæ and perfect state. Curtis has observed some of them "as thick as very stout cotton." In the large family, *Carabidæ*, so eminently serviceable in reducing the ranks of noxious insects, is a beetle, *Carabus* of Linnæus, but is now known as *Steropus madidus* of Megerle, a very active insect, prowling about at night seeking whom he may devour. This insect, to enable it the more to stand firmly, and resist any efforts made by its captives to escape, has its legs well furnished with spurs and spines. With its long palpi it embraces its victim, whilst it tears it in pieces with its sharp and powerful jaws. The elytra of this beetle are soldered together, therefore it is without wings, and consequently unable to fly. *Nebria brevicollis, Fab.*—The larvæ of this beetle, as well as the mature insect, is supposed to be carnivorous, and prey upon wireworms, &c. These beetles love not the sunshine, being seldom seen then, unless when disturbed. But when the shadows of evening gather around them, they sally forth from their hiding places with keen appetites and whetted mandibles ready for execution. Then woe betide the poor wireworm which may cross their path, whom darkness also has brought forth from its seclusion in quest of pastures new. The click-beetles themselves are often assaulted by minor foes which, however, may not kill them, but must greatly weaken their energies by extracting the juices out of their bodies. Two of these I will notice. They are very different species, but belong to one class, *Arachnides*, which class embraces animals,

not insects, as widely different as from the huge spiders and millipedes, to the tiny mites of the black currant buds, and order *Acera*. The first belongs to the family *Ricinus* or ticks, genus *Uropoda* of Latreille. *Elater obscurus* is often infested with the tick, *Uropoda umbilica* of Curtis. It is oval, rusty-brown and shining, and attaches itself to the wing cases by a peculiar thread-like sucker. It is supposed these creatures obtain their nutriment through this tube. Whither or not they are possessed with a rostrum for sucking, Curtis was unable to ascertain from the extreme minuteness, and obscurity of their head. The other parasite belongs to the family *Mycrophthira* and genus *Leptus* of Latreille. It infests *Elater ruficaudis*, and is quite a distinct little animal from *Uropoda umbilica* in appearance and mode of living. *Leptus Phalangii* is of a brilliant scarlet colour and soft. It thrusts its beak into the punctures of the thorax and elytra of the beetle, whereby, to sustain its own life, it extracts the life-giving fluid out of its prey.

The monthly meeting of the Stirling Natural History and Archæological Society was held in the Smith Institute on the evening of Thursday the 5th June—Mr Croall in the chair. After minutes of meeting had been read by Secretary, the consideration of the Access to Mountains Bill, which had been deferred for a month for further information, was proceeded with, Mr Chrystal reading the various provisions of the Bill. After some discussion, it was proposed by Mr Chrystal, and seconded by Mr Shearer, that the Society petition for the Bill as it stands. Mr Cook proposed, and Mr M'Dougall seconded, an amendment, that the Society petition for the Bill with the addition of Access to Rivers' Banks. On being put to the meeting, the majority voted in favour of Mr Cook's amendment, which was accordingly declared carried. Mr Chrystal proposed Mr Sword, Procurator-Fiscal-Depute, as a member of the Society, and his nomination was cordially supported by the Chairman and Mr Gilbert MacDougall. Mr Croall then read the concluding part of his paper on "Insect Miscellanies, or the History of Entomology." Specimens of the following plants and mosses were laid out for exhibition :—*Lastrea spinulosa*, from Flanders Moss, identical with specimens from the original locality in Nottinghamshire. *Peucedanum Ostruthium*, in flower and fruit,

from near the "King's Yett," Touch Moors. Fragments of a Roman Urn, from the Roman Camp at Ardoch. *Allosorus crispus*, from the Ochils, where it is now nearly extirpated, though abundant a few years ago. *Geranium molle*, with white flowers, and *Hippocrepis comosa*, in flower, from Devonshire seed. Beautiful examples of *Gomphonema geminatum*, and of the peristome of the capsule of the moss, *Bryum rostratum*, were shown in the microscope. Some of the rarer mosses, new to the district, were also exhibited, as *Gymnostomum Donianum*,—*Weissia pusilla* and *acuta*,—*Tetraphis Browniana*,—of the Scale-Moss, *Metzgeria pubescens*, and of the Fungus, *Puccinia glomerata*. A vote of thanks to the Chairman for his paper concluded the proceedings.

The usual monthly meeting of the Stirling Natural History and Archæological Society was held in the Smith Institute on the evening of Thursday the 4th September—Mr Croall presiding. After minutes of June meeting had been read and approved of, Mr Chrystal, secretary, submitted a recommendation by the council of the Society to the effect that a special committee, consisting of Messrs Croall, Kidston, and Walker, together with the Secretary and Treasurer, be appointed to arrange the preliminaries as to the local museum. Dr Galbraith moved, and Mr M'Dougall seconded, the adoption of this recommendation, which was accordingly agreed to. A conversation ensued, in the course of which Mr Robert Kidston said that unless the room to be used for a museum was properly lighted, it was utterly useless for the purpose of exhibiting specimens, and he accordingly moved that it be remitted to the Museum Committee, with instructions to communicate with the Smith Institute Trustees, as to the proper lighting of the museum, which could only be satisfactorily effected by placing windows in the roof. Mr Croall seconded Mr Kidston's motion, and it was therefore agreed to allow the recommendation of council to lie over for a month, until the decision of the Trustees as to the question of lighting should be known. Mr Croall explained that the Rev. Mr Paul of Dollar, who was expected to be present and to read a paper on "Castle Campbell," had gone for a holiday tour in Switzerland, but in his absence he (Mr Croall) had prepared the "Notes," which we give below, on the various specimens,

archæological, botanical, and mineralogical, which were placed on the table for exhibition. Dr Galbraith moved a hearty vote of thanks to Mr Croall for his conduct in the chair. This concluded the business of the evening.

NOTES ON EXHIBITS.

Fragment of Roman urn or vase, dug up in the Sandpit at Cambusbarron, and, unfortunately, broken, last April. The fragments might have been restored if preserved, but they were thoughtlessly allowed to be carried off by any one who choose, and in most cases likely to be thrown aside and forgotten, or what is perhaps just as likely, consigned to the ashpit or the dung heap.

Similar fragments, of somewhat different composition, and possibly of a water jar with a handle, obtained in laying water pipes near the Roman Camp at Ardoch. These remains might have been of considerable interest had they been carefully preserved, instead of being thrown among the rubbish and lost.

A piece of oak bark, two inches in breadth, stripped from a tree at Gartur, near Lake of Monteith. The bark was clean stript off from among the branches to the surface of the ground, and in the centre of the wood a channel was scooped out in the wood about three-quarters of an inch in width and half an inch in depth. Two strips had been detached nearly similar, one on the east and another on the north side of the tree. No appearance of charring or scorching appeared either on the bark or on the wood, and it seems to me to be a question of no little interest how the force that detached wood and bark had been applied. To me it seemed to have been applied externally, and to have been the result of a sudden vacuum produced along the line of contact of the electric fluid, but I have not seen any explanation given of the phenomenon.

Several plants shewing complete coalescence of the parts. A flower stalk of Dandelion, in which two stalks had grown together all the way, but had formed separate flowers at the summit.

Branch of a plane from Craigmill, in which six branches have fasciated for a distance of six inches, but have then come to a stand still, one only then proceeding alone, the others forming a crest of buds. Several buds also appear on the edges of the broad part of the stem.

Stems of beet which have grown together for nearly a foot, and then agreed to dissolve the

partnership, one of them having decided to start on its own account before they had proceeded far on their journey.

Linaria vulgaris, var. Peloria. This curious monstrosity is said to be of not unfrequent occurrence, and has been long since noticed and described, but I have not happened to meet with the plant in a living state before, having, however, received dried specimens from various correspondents. The calix is regular, and the personate or snap-dragon like mouth of the corolla has been trying to become regular also; for although it has become regularly five-toothed, it is curiously rolled back, and the base has been prolonged into five long acuminated spurs, as if there had been some necessity of using up the superabundant matter.

The slow-worm or blind-worm, from the neighbourhood of Rowardennan, Loch Lomond. This is the smallest of our three species of snake indigenous to our island. It is not uncommon in dry, sandy or stony places, but is retired in its habits, and is quite harmless. The common ringed snake is mostly confined to England, and is also harmless, but the adder is common to both, and is readily distinguished by the zig-zag dark stripe down its back. It is more or less venomous, and is perhaps more so according to the season, and perhaps other causes as well.

Ancient fishing reel from Dean of Guild Shearer, which has no doubt seen some service, and might tell some Waltonian tales of more than one generation.

Copper ore from the mine of Tign-na-Dassy, Ardtalnaig on the south side of Loch Tay, Perthshire. The mine was at one time worked by the proprietor, but although the ore is not at all poor, wages have become so high that the ore will not pay for its extraction.

I have no reports of Excursions to offer on the present occasion, not having been able to attend any of them or even get from home during the early part of the season; and no reports have been handed in by any of the members; the Botanical section, however, has not been idle and some interesting additions have been made to the Botany of the district, both among the Flowering plants and Cryptogams.

In an excursion for the purpose of dredging for water plants in Airthrey Loch, some interesting species occurred. The rare and beautiful *Villarsia nymphæoides* was found in great abundance, and

flowering in profusion. This plant has not, that we know, been recorded for Scotland and is rare even in England. The leaves very much resemble those of the White Water Lily, but they are much smaller and the flowers are yellow and very delicate. Several species of *Potamogeton* were also obtained on this occasion but these will require to be noticed again. Some interesting species of Freshwater Alga also occurred to which we may again refer, when we have had time to compare and examine them more carefully.

In an Excursion to look after the water and other plants of the Forth some very good finds were also effected. On the north bank of the river opposite Craig Forth, the *Stellaria glauca* (Glaucus Marsh Stitchwort) was found in some plenty along with the Short-beaked Bladder Carex *(Carex vesicaria)* and the Slender-beaked Bottle-Carex *(C. ampullacea)*, the first in some plenty, the second, as everywhere, abundant. In the river, near the same place, were found also *Potamogeton prælongus*, *P. perfoliatus*, *P. crispus* and *P. heterophyllus*, and other more common species.

A very successful Excursion was made for the same purpose also to the Lake of Monteith, and some very important additions to our knowledge of the vegitation of that district was obtained. Near the landing stage at the north-west corner of the Lake we found abundance of the Yellow Loosestrife *(Lysimachia vulgaris)*. The term *vulgaris*, however, seems rather to have been applied to the plant as a border resident in our gardens as far as this country is concerned, than to its occurrence in a wild state, as it is certainly *common* in the former. but I have never met with it before growing wild. In that locality, however, it seems not only to be plentiful, but to all appearance indigenous, but though abundant in that locality we did not observe it elsewhere about the Lake, although the Purple Loosestrife is everywhere observed, but especially abundant about the east end of the Lake. On the north-west shore the Round-leaved Sundew was abundant and remarkably luxuriant, many of the the plants being 7 and 8 inches high. On a former visit we had also found the Long-leaved or English Sundew *(Drossera Anglica)* in equal abundance and luxuriance, but farther to the eastward ; the shore, however, was there too shallow for the boat to effect a landing. On our last visit to the island of Inchmahome it was recorded that the Scotch Lovage *(Ligusticum Scoticum)* was abundant among the

ruins of the Abbey as well as the Celandine *(Chelidonum majus)*; of the first, the leaves only were observed, and consequently the reference was doubtful. On the present occasion we were anxious to visit the ruins with the hope of finding the plant in flower or fruit in order to settle the point. On landing, however, we were greatly disappointed to find scarcely any vegetation in the ruins; only a plant or two of the Celandine, and not a leaf of the plant supposed to be the Lovage. It will be remembered that the plant which we had referred to, the Scotch Lovage, in the neighbourhood of Stirling, had proved, on coming into flower, to be quite a different species—the Masterwort—*Peucedanum Ostruthium*, and we had every reason to believe that the plant observed on Inchmaholme would prove to be the same. We were therefore anxious to meet with it on the present occasion, but not a vestige, even of the leaves, could be found. It will also be remembered that the Masterwort by the roadside towards the "King's Yett," in the Touch Moor, was found abundantly in flower and fruit, and satisfactorily identified, and it is more than likely that the plants in the three different localities are identical, and that the plant observed on Inchmahome was also the Masterwort. It is to be hoped that the plant on the island has not been entirely eradicated, so that it may yet be identified on some future occasion. On the outside of the Box hedge round Queen Mary's bower, a Box tree, not observed before, was now noticed, about eight or nine feet in height and six inches in diameter, it had still a few green leaves at the very summit of the branches, but all the rest was naked, even almost of bark. It was evidently of great age, and might have been planted by the hands of the unfortunate young Queen herself in the days of her imprisonment. The other trees and plants on the islands were much the same as on a former visit. The old hazels appear to have been supplanted by young shoots from the roots of old ones, and these, though old, are still bearing, but most of the old and venerable chesnuts have now disappeared, and only a young one here and there is rising up to supply their place. A considerable part of the island appears to have been artificial, formed on a foundation of stones, most likely brought from the shore; these are still visible round the eastern shores. Between the landing and the island we obtained some interesting water-plants. The most important of which were *Potamogeton perfoliatus*

(perfoliate Pondweed), *P. prælongus* (Long-stalked Pondweed), *P. lucens* (Shining Pondweed), *P. heterophyllus* (various leaved Pondweed). In dredging round the island, *Isoetis lacustris* and *Elatine hexandra*, also occurred, and in crossing the moor to the Station, several species of interesting plants were collected. *Splachnum sphæricum*, with male flowers, and *Dicranium heteramallum*, and also the White Beaked-Rush *(Rhinchospora alba)*, was observed in plenty, and the trailing stems of the Cranberry were often noticed, but not often the fruit. In the pond at the farm of Gartur we found the Little Pondweed *(Pot. pusillus)*, in abundance, and in fine fruit.

During the early part of the summer, the Leny and Gargunnock Hills have been repeatedly visited by Mr Sword, one of our members, and some very interesting additions have been made, chiefly to our local Cryptogams. Very fine and richly fruited specimens were obtained of *Hypnum loreum*, *Bryum crudum*, *Tetraphis Browniana*, *Weissia pusilla*, *Andreæa rupestris*, *Rothii and alpina*, *Bartramia Halleriana and ithyphylla, and several others.*

Several excursions, interesting in their results, have also been made in the vicinity of Crieff, chiefly in order to investigate the Water and Marsh Plants of that district. The most important plants found, were the Little Water Lily, *(Nuphar lutea,)* the Spiked Water Milfoil, *(Myriophyllum,)* the Gipsywort, *Lycopus Europœus*, the Bullrush, *Typha latifolia*, the Lesser Common Sedge, *(Carex paludosa,)* the Autumnal Water Starwort, *(Callitriche autumnalis,)* and several species of Chara. These excursions were under the direction of Mr Kidston, and the most important item of information obtained is our acquaintance with *Carex paludosa*, which although readily recognised when once seen, seems very difficult to characterise, so that we have never been able fully to understand it. Instead, therefore, of being, as it is generally represented, common, it would appear to be one of the rarest, and has, I am satisfied, never come under my own observation. In characters, it comes very near *C. Ampullacea* and *vesicaria*, but in general appearance it more nearly resembles *C. Riparia.*

Mr Robert Kidston exhibited a fine specimen of a fossil *Alga (Spirophyton caudi-galli, Vanuxem sp.)* from the carboniferous limestone series, Spouthead Burn, Milton of Campsie, Stirlingshire. The bed from which the specimens were taken is about two feet think, the upper two-thirds of which is one

mass of this fossil. The specimens from the uppermost part of the bed have fragments of marine shells and encrinital joints mixed (or perhaps entangled) with the segments of the fronds. As the name of the fossil implies, the fronds grew spirally round a central axis, so the blocks break very irregularly, the fractures following the direction in which the fossils lie. This *Alga* must have had considerable consistency, as a great deal of powdery carbonaceous matter lay on the newly split surface of the slabs. For a short distance the stream flows over the exposed *Spirophyton* bed, removing the carbonaceous remains of the plants, and leaving their impressions as beautifully sculptured tracery on the surface of the sandstone. The example exhibited was rather more than a foot in diameter. Mr Kidston mentioned his indebtedness to his friend, Mr John Young, of the Hunterian Museum, Glasgow, who kindly informed him of this locality for *Spirophyton*.

The first sessional meeting of the "Field Club" was held on Tuesday evening, 7th Oct., when there was a fair attendance of members. The retiring president, Mr Croall, reviewed the work of the year, and congratulated the members on increased success.

The SECRETARY read the following report:—

The session just closing has been one unnoted by any special discoveries and undisturbed by any peculiar events, but yet one which, we confidently expect, will be looked back upon as a new starting point in the history of the society. Without further preface, we proceed to the consideration of the subjects usually embraced in such reports as the present. Our monthly meetings during the past year have been interesting and instructive; and the numerous papers, notes, and communications read on subjects strictly local, testify satisfactorily to the fact that we have not lost sight of the primary objects for which our society was called into being, viz., the elucidation and "working up" of the natural history and antiquities of the district. The meetings have been fairly well attended, but as we do not wish this report to be an unreliable statement laying force on satisfactory points, and glossing over those less satisfactory, we are led, with all earnestness, and in a spirit which we are sure will not be mistaken, to urge members to attend with greater regularity and in larger numbers. We do not of course wish to force those who are unwilling to come (for an audience which comes with no idea of benefitting from what may be said, or, still worse, which comes as captiously critical of what may be said is more dangerous than even

empty benches), but we are anxious that this society, which in other respects is doing good and constantly progressive work, should neither fall away nor decline in that portion of its constitution, which ought to be most popular, and which has in the past been the chief motive to further work and inquiry, viz., the monthly meetings. No doubt a series of unfortunate events, combined during the session just ending, to thin the attendance at these meetings. From a variety of causes we were unable rigidly to adhere to our printed syllabus; and although we had a number of very good papers, we are bound to admit that in former years we were able to present a more varied and scientific programme to our members. May we hint at the same time that this reproach will next session be put far from us. Every meeting has already been arranged for, and with such lecturers or readers of papers as the Rev. R. Paul of Dollar, Mr Lumsden of Arden, Mr Stewart of Tich'n-duin, Mr Harvie-Brown of Quarter, and the Rev. Dr Ross of Bridge of Allan, besides many others well known to all of us, we should during the coming twelve months have larger audiences and more regular attendance. While thus making, as we have fully made, every allowance for the failures and shortcomings of last session, we can still point with considerable, if not unalloyed, satisfaction to the papers read by Miss MacLagan, Mr Todd, Mr Stewart, Mr MacIntyre, and Mr Croall, as being examples of what papers, read to a society such as ours, should be. These papers treated of a variety of subjects, most of them local, and, in many cases, the discussions following on them showed that if we were but few in numbers, we were strong and healthy in the inquiring turn of our minds. Having previously referred to the variety of causes which combined to thin our meetings, it is necessary to state that the Council have had these causes under their consideration, and a general opinion prevails that the chief of them—and one which has brought many lesser evils in its train—is the night on which our meetings have been held during the last two sessions, viz., the first Thursday of the month. When the change was made, it was because of a newer institution which had sprung up in our midst, and the fear then was that its attractions would be a decoy to our members. The fear proved groundless. Only one or two of those in authority here had to attend at the other place; while very many of our best members found it simply impossible to come on Thursdays. We, therefore, propose to revert to our former night of meeting, in the expectation that by so doing we will increase our attendances, and that our meetings will be then less likely to clash with others appealing more to popular tastes than ours do. We are not unaware, indeed, that there are causes outside of mere accidental circumstances which also have had to do with the

depletion of our ranks. When scientific societies are first formed there are always a number of good-hearted, good-natured people ready to give a "lift" to a movement for the public good, as they say. By-and-bye, our benevolent friends begin to grow tired of the work; they are not scientists; they find the meetings tedious; and one by one, shamefacedly at first, but with increasing and lamentable boldness, they begin to find excuses for their remissness. Then they find the meetings interfere with their other engagements; and, besides, they ask, what use are we to the society; we cannot increase its collections, nor add by our presence to its weight; and so, step by step they advance to the crucial point, and when the treasurer waits upon them with a note of subscription, and possibly of arrears due, they- in fact—they—well—just in a word, and as they themselves would put it, "find it inconvenient to maintain their connection with the society;" and thus it is that in a few years we come to see, by experience useful though bitter, that we must depend on those who are really interested in the objects for which our society exists to carry out its aims and to further its purposes. On the whole, we may congratulate ourselves on the manner in which we have come through the thinning process, and it is at least certain that we have not lost, save by death, or for some good reason, any member whose enthusiasm was so conspicuous as to make him remarkable when the Stirling Field Club was founded in this room in 1878. The work of our society, however, is not confined by any means to the monthly meetings. A great part of the work is necessarily carried on quietly and remote from vulgar view, and the gradual and steady increase in the bulk of our floral collection shows that some of our members retain to this day their youthful nerve, neither diminished nor lessened by lapse of years. Their motto is, as they patiently work on, day after day—

" . . . . *Dum loquimur fugerit invida*
Ætas; carpe diem, quam minimum credulo postero;"

and it is only by this spirit of working, by and for the day, that we can hope to overcome our difficulties—and continue our existence. We turn now to the consideration of another subject referred to in the special circular issued in connection with this meeting, which is the area of the Society's operations. Hitherto we have pursued investigation throughout a district enclosed by an imaginary line of twenty miles around Stirling Castle, as a centre. That arrangement experience has proved to be neither scientific nor politic. A glance at the map will show how very large is the district the natural history and antiquities of which we have, under it, arranged to explicate. We now propose to alter our boundary lines, and limit the work of the Society to the basin drained by the Forth and its tributaries. We are satisfied that this arrangement if carried out, will be of very great practical

value in a variety of ways. There is just one more point with which we have to deal in this part of our report. As most of you may be aware Mr Harvie Brown of Quarter, one of our vice-presidents, has always shown interest in the success of our society. Writing recently on the subject, he says—"I observe the Perth Societies have appointed Committees to report on each branch they have taken up, an almost universal practice now in local societies. I think the Stirling N. H. & A. Society would benefit by some such arrangement, and at the same time secure steadier supplies of local materials; and more of the members in this way might be induced to contribute. Even if a list of subjects were drawn up some might be induced to undertake investigation and report privately or at a meeting, so that in time results of united action would become apparent. . . . I have always held that local work is the true work of a local Society." The suggestion contained in this letter is not a new one. Some sessions ago various heads of the different branches—botanical, geological, entomological and archæological—were appointed, but, unluckily action did not follow. It is not yet too late, however, to take up the matter; and as next year's syllabus is not in type, something might be appropriately said there. At any rate the matter ought not to be lost sight of. During the session the council have had numerous meetings; and it is extremely satisfactory to have to record that the attendance at these has been large and regular. More work, and matters requiring careful consideration, matters of business and wearisome detail, have been discussed this year than, we believe, in any previous one of the society's existence. The council's work is very little heard of, but, on that account, it is none the less real. Having thus briefly indicated what we have been about during the session, in connection with the more immediate work of a scientific body, it is time to undertake consideration of another subject to which your attention has been directed previously on different occasions. You would, no doubt, observe in the circular issued in connection with this meeting that there were to be embodied in this report some "notes on the objects and aims of a local museum." These have for the most part been prepared by another and an abler hand, and to their author, who has done so much to instruct and encourage us in this matter, it is only fitting that we should give our thanks. Before, however, reading these notes, something in the way of preface and explanation may be permitted. In the report submitted to you last year, matters were traced down to the date of the report, at which time we were just entering into negotiations with the Smith Institute trustees. Since then great progress has been made. There was, of course, some delay, and various agreements had to be entered into between the parties

concerned. We have secured at a nominal rent house-room for the cases in which to contain our collections; and we have also, in our agreement with the Smith Institute trustees made various stipulations by which our museum will be not a mere corner of the place, hidden away out of sight, and left to such chance notice as enthusiasts may have to spare, but will become one of the chief attractions of the place. As it was only at last monthly meeting that a special committee was appointed to carry out the remaining preliminaries, it is happily unnecessary again to recapitulate the many details then stated. Matters are now so far advanced that we have a pretty fair idea of the cost which will, on a moderate estimate, made by a competent man, amount to between £350 and £400. These figures show that we have a very great deal of hard work in prospect. The brunt of the work must needs fall on one or two, but all may make efforts to crown our labours with success. It is not only money that is required: though that is very essential; we require goodwill and kindly encouragement and active sympathy. These we feel assured we can have from you all for the asking. It is with very great pleasure that we embrace this opportunity of thanking, as we now most cordially thank the Smith Institute Trustees, and particularly Provost Yellowlees and Mr Barty, for the great kindness and anxiety to further the objects the society has in view (not for its own selfish ends, but for the public good), which they have shown in all the communications and correspondence we have had with them. Work of this kind is always easier of performance and likelier to succeed when all parties are in harmony. It cannot be well done by a faction, neither in a factious spirit, being a work purely of zeal, and when, instead of rebuff or bootless fault finding, one receives kindly aid and encouragement, one is nerved to further action and continued perseverance. Our time does not permit, nor indeed is it within the province of this report, to trace the development of the museum idea from its foundation in Alexandria in the time of the Ptolemies, down through all the ages to our own period. Perhaps never since its first foundation in Alexandria has it attained a like grandeur, not only in conception, but also in completion, but what it has lost in grandeur of conception, it has gained in elaboration of detail and variety, and to-day, go almost where we will, we find the museum an institution of the place. Stirling ought certainly not to lag behind in this respect, and at present it is very far back. In the large room, called a museum, in this building, there are no doubt a number of things, illustrative of nothing in particular; interesting perhaps in a way, but certainly of no local value. What we propose to do the following notes explain, and if successful in our project, we will certainly not have existed in vain.

The chief aim in view in forming a Local Museum

is to afford facilities for the study of Natural History to all who may have a desire to do so. It is well known that naturalists, when beginning their studies, have much greater difficufties to overcome in their pursuit of knowledge when their book studies are accompanied by the examination of accurateiy named specimens; and it is with the view of rectifying this want, and to aid those who are studying natural history or antiquities, especially those residing in our own neighbourhood, that the formation of a local museum has been proposed. But still further good is hoped to arise from the formation of a local museum. It is well known that the flora and fauna, recent or fossil, of any district, can only be fully worked out by those residing in the district. It is true that much can be done in special branches by those conversant with them, making shorter or longer visits to any particular area, but the thorough working out of the occurrence and distribution of the flora and fauna of a given area, can only be thoroughly accomplished by naturalists residing in the areas under examination; and there are many phenomena connected with variation and the distribution of species which still require much elucidation. The proposed museum will therefore be strictly local, and for the reception of specimens from the district as defined in the presidents's remarks. In addition to its formation being undertaken mainly for assisting naturalists who reside in the neighbourhood there is another very good reason why it must be strictly kept only for the reception of local specimens, and this is, if other specimens were accepted, we would not have sufficient room left for the exhibition of local specimens, for though the space kindly put at our disposal is ample for a first-rate local collection, it is not sufficient for a general natural history collection perhaps, and further the Smith Institute have reserved space for such specimens as do not fall under the head of "local." An "index collection" would also be a useful addition to the beginner in natural history, but this also can be much more conveniently included in the existing museum of the Smith Institute than in the proposed local museum, as many foreign examples are necessary for its formation. Then as to the specimens desirable for a local museum and who is to collect them. 1st, As to specimens—These must be collected from all parts of the district—even specimens of the same species, both to shew their distribution in the area under consideration and the

variations, if any, which takes place. The great importance of such collections does not at first appear when we "examine ourselves by ourselves," but when we compare our specimens with those collected in other neighbourhoods, the lessons to be learnt from them are much more obvious. We will find, then, that many that may be common in our district are very rare in other neighbourhoods, which appear to afford similar conditions to ours, or if found in one district and not in another, a comparison of the conditions of the two districts may enable us to find out many interesting points connected with the life history of the organisation with which we are dealing. 2d, As to collectors—These must be all in the district who are willing to give a helping hand. It is not requisite that one should be an experienced naturalist. To begin with, all that is necessary is that those who are willing to assist will use their eyes, and reflect on what they see. They may not know what is the name of the specimen they have collected, but for a beginning that is not necessary. Having got the specimen, if forwarded to the local Museum Committee, it will be submitted to an expert to be determined. The collector having been furnished with its name (we are presuming him to be a beginner), will then be enabled to find out where it is described, and so learn all about it. One thing is, however, very necessary to make specimens of any value, and that is a note containing the locality and date of collection, together with name of collector, and any particulars that may be thought worthy of note. The only thing necessary for the successful formation of a local museum is that all interested in natural history and antiquities, however unskilled, will do what they can, and they will not only help others, but themselves derive an amount of pleasure of which they previously had no conception. Time permits of no further remarks of ours, and such are hardly needed. It remains with us to give practical effect to what has been said, and we fully intend to do it. May I, as your secretary, be permitted one word in closing, and it is one of thanks to the Council who have borne my numerous shortcomings with heroic patience. It would be absurd to think that, unaided and unguided by wiser and older heads, I could carry on the important work we have undertaken, and such guidance as I sorely need has never been refused by my colleagues in the Council.

Two motions were brought before the meeting—

the first as to the alteration of the day of meeting from Thursday to Tuesday, proposed by Dr Galbraith and carried unanimously, and the second changing the area of the society's operation to "the basin of the Forth, the eastern limit being Queensferry." Mr Kidston stated that the proposed area contained about 300 square miles. The proposal, it was stated, was not meant to exclude the collection of specimens from other districts, having in view, however, that the principal work of the Society was to work up the subjects more immediately local. The proposal was accepted *nem. con.*, and the meeting concluded with votes of thanks to the Secretary and Chairman. A number of specimens of plants, mosses, and fossils of the district were exhibited during the evening.

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CONTENTS.

1884.	PAGE
Nov. Meeting,	1
"Castle Campbell," by Rev. R. Paul, Dollar,	2
Dec. Meeting,	27
"Notes on Polypifera," by Mr Alex. Croall,	28
1885.	
Feb. Meeting,	35
"The Island of Handa; with Notes on its Bird Life," by Mr James Lumsden, F.Z.A., F.S.A. (Scot.),	36
March Meeting,	43
"The Migration of Birds," by Mr J. A. Harvie-Brown, of Dunipace, F.R.S.E., F.Z.E.,	43
May Meeting,	63
Abstract from "Notes on the Early History of the Parish of Logie," by Rev. Dr Ross, Bridge of Allan,	64
June Meeting,	67
Memoir of Mr Alex. Croall, late President of the Society, by Rev. W. F. Goldie, Stirling,	67
Sept. Meeting,	73
"Extracts from Kirk Session Books of Culross, 17th Century," by Mrs Hogg, Stirling.	73
"Notes by the Way—Birds," by Mr Gilbert M'Dougall,	84
Oct. Meeting,	88

STIRLING NATURAL HISTORY AND ARCHÆOLOGICAL SOCIETY.

The usual monthly meeting of the above society was held in the Smith Institute on Tuesday evening, 4th Nov., the Rev. Mr Goldie presiding in the unavoidable absence of Mr Croall through illness. After minutes of October meeting had been read, Mr Chrystal, secretary, called attention to certain recommendations of Council, which would be found in the syllabus just issued for session 1884-85. These were to the effect that the work of the society can only be satisfactorily performed by each member concentrating his or her attention, for the most part, on that subject in which each is specially interested. With the view of giving practical effect to this idea, the Council have resolved to appoint Committees on each of the following Branches, and they expressed the hope that the members of the Society would intimate to the respective Conveners, which Branch they would wish to study, so that united effort might immediately be begun. The following are the Committees with powers to add to their number :—Botany—Messrs Croall, Sword and Gentleman—Mr Croall, convener. Geology—Messrs A. Moyes, R. Kidston, and Rev. J. E. H. Thomson—Mr Moyes, convener. Zoology and Allied Subjects—Messrs J. A. Harvie Brown of Quarter, James Lumsden of Arden, David Bruce, and Gilbert MacDougall—Mr MacDougall, convener. Archæology—Ex-Dean of Guild Shearer, Mr A. F. Hutchison, Rev. W. F. Goldie, and Mr David Chrystal—Mr Chrystal, convener.

Mr GOLDIE, in appropriate terms, then introduced the Rev. Mr Paul, Dollar, who read an exceedingly interesting and exhaustive paper on "Castle Campbell," illustrated by beautiful drawings and specimens found among the ruins of the Castle. These consisted of coins of Queen Mary, Charles I., and Charles II., pieces of charred oak beams, a spur, iron staples and bolts, and other relics. A very hearty vote of thanks was, on the motion of Mr Chrystal, enthusiastically passed to Mr Paul for his admirable paper, and to the young lady who had so kindly executed the drawings. This concluded the business.

CASTLE CAMPBELL, THE ANCIENT STRONGHOLD OF THE ARGYLL FAMILY.

Paper by the Rev. Robert Paul, Dollar.

It has occurred to me that it would be interesting to put together in one connected narrative, all that can be gathered regarding this old baronial pile, so familiar to most of us. Here and there in various quarters are to be found incidental allusions to it, but so far as I am aware, no connected or complete account of it has as yet been written. Nor is this perhaps at all remarkable, seeing that the Castle has never been the scene of any great or exciting incident in the stirring and eventful history of our native land. It is, however, somewhat strange when one considers the prominent and important parts which its owners, the successive Earls of Argyll, played in that history at various times, that so few references should be found to it in contemporaneous records. There can be no doubt that the Argyll family often resided at Castle Campbell during the three and a half centuries for which they held possession of it. Indeed, some would even have it that it was their favourite residence. Be that as it may, many of the original feu-charters given to the inhabitants of the village of Dollar, conveyed to them portions of land on the condition of their performing certain regular services to the family. Thus one person had to supply them with coals, another with beer, a third with grey oats for the horses, while in some of the charters the vassals are taken bound to carry the wine used in the Castle from the Port of Alloa, and in others, to furnish horses to bring their superior and his family from Stirling, where he occasionally resided at Argyll House in attendance at the Scottish Court. Such stated services as these on the part of the retainers, seem to indicate a more or less continuous habitation of the Castle by the Argyll family. Inverary and the numerous other castles which they possessed in Argyll and the other western shires, were too far away from the metropolis and the other centres of active life and intrigue, to be very frequently used by them as a home. But their ancient stronghold on the Ochils was eminently suited for this purpose, situated as it was almost in the midlands of Scotland, within a few hours' ride of Edinburgh, and affording, from its position and strength,

a near, safe, and well-nigh inaccessible retreat on occasions of danger. We can easily understand, therefore, why, as there is considerable evidence to show, Castle Campbell should have been a favourite place of abode with them. But it is remarkable that so little mention should be made of it in connection with a race so conspicuous in Scottish history. It is true that several traditions exist about it, sufficiently curious and interesting in themselves. These relate both to earlier times than those during which the Argylls possessed the Castle, as well as to those of their occupancy. But with hardly an exception these traditions are found on close enquiry, to rest on very slender foundations, while some of them are undoubtedly entirely apocryphal.

The site of the Castle seems almost to have been designed by Nature for such an erection—a fact of which the early castle builders were very quick to take advantage. In these days of Armstrong guns and ponderous ordnance, it would have but little chance of successfully resisting a siege, notwithstanding its massive character, and elevated and isolated site. But it was very different three or four centuries ago. Occupying as it does an eminence or knoll of considerable height, within one of the narrow glens which run far north into the heart of the Ochil range, it has the advantages of natural defences far surpassing in value any artificial ones which could have been contrived. This eminence stands just where the main glen bifurcates, and forms an angular space between two mountain streams, which, flowing on either side, unite their waters immediately to the south of the Castle. The sides of this eminence are exceedingly precipitous—being several hundreds of feet high—except on the northern side, where the main entrance to the courtyard is situated. Here in former days was the drawbridge—the foundations of which have been discovered in recent times—with an artificially formed fosse or ditch shelving down to the bottom of the glen on either side. The outline of this ditch can still be easily traced, although the ditch itself has been almost entirely filled up. Previous to the year 1865 the only road to the Castle was that which running through the old town of Dollar, ascends the western side of the hill called Gloom Hill, which flanks the eminence on which the Castle stands on its eastern side. All access by way of the glen was effectually barred by the exceedingly steep and rocky nature of the sides. In 1865, however, a footpath was completed by

public subscription, with the consent of the proprietor, along the face of the eastern side of the glen. This path, cut in many places out of the rock, and carried over several bridges, separates into two portions at the junction of the two streams immediately below the Castle, and now affords an easy and most picturesque ascent by either side of the eminence on which it stands. The old roadway, up which many a cavalcade must have passed in former days, is now but little used. The buildings of the Castle do not by any means occupy the entire summit of the knoll. To the east and west they overhang the more or less precipitous sides. That on the east is less so than the other. On this, immediately below the Donjon or Keep, there is a steep bank of loosely compacted soil, frequently used of late for the growth of vegetables. I cannot help thinking that this has been largely formed by travelled earth in recent times, and partly by the accumulated *débris* from the overhanging ruins, during the two centuries which have elapsed since the destruction of the Castle. What is strongly confirmatory of this view is the fact that this soil is found, when dug into, to be much mixed with ashes, broken bones, and pieces of stone. Small coins, old tobacco pipes, fragmentary tiles and potsherds have been found in it during the past few years. And what is still more interesting, the man who at present resides in the Castle, and acts as its caretaker, has informed me that on digging down a few feet below the surface he has repeatedly come upon the remains of what seemed to have been a causeway or perhaps a breastwork of hornised stones. It is quite possible that in former days there may have been some sort of pathway round the buildings at this point. Or this stonework may have been formed by way of defence, partly to act as a sort of retaining wall, and partly to make it more difficult to scale this, the least inaccessible, side. It is remarkable, however, that this apparently travelled earth, filled with fragments of stone and bones, is also found *beneath* this causewaying, and reaching to a considerable depth. This would almost indicate that these causewayed stones are of comparatively recent origin. At the outer or eastern edge of this loose soil—and several yards down the slope, where it becomes steeper—there may have been a wall of some kind. Indeed there is good reason to believe that originally a wall or rampart ran round the entire summit of the knoll. The foundations of

such a wall have been found beneath the turf in numerous places. Part of this wall, close to the curious fissure known as Kemp's Score, at the south-western edge, is still standing, consisting of a ruined arch or gateway leading to the top of an adjacent isolated rocky height, up the wooded front of which there is the only place where it is possible—though very perilous—to climb up from the ravine below. Between this and the Castle there is a considerable extent of ground, the portion of which nearest to the buildings—about thirty-eight yards long by thirty yards broad—is surrounded by a wall, flanked at the south-eastern corner by a watch tower—now in ruins—and forming the castle garden. Outside of this is a piece of gently sloping grassy sward, some 36 yards square or thereby. It is generally believed that vaults and dungeons, hollowed out of the rock, exist beneath this area. When the sod is struck or stamped upon heavily, a curious and reverberating sound results, and an iron rod, several yards long, has been easily thrust down without meeting with serious obstruction. If such dungeons do exist, all traces of entrance to them within the castle have completely disappeared—hidden by the accumulated masonry which has fallen in. The chasm or fissure to which I have just alluded, and which goes by the name of Kemp's Score, is a remarkable feature of the external surroundings of the castle, and merits a few descriptive words. This fissure is a straight opening in the rock, running down at an angle of about 45 degrees from the south-western corner of the grassy area which I have spoken of in front of the castle. It reaches almost to the spot where the two streams, already mentioned, effect a junction, and is about a hundred feet long by six wide. There can be little doubt that it is the result of natural causes, helped probably by artificial means. It is said that it was used by the inmates of the castle in former years as a passage for the conveyance of water from the stream below in the event of a siege. That this is not altogether improbable appears from the fact that rude stone steps have been discovered in it, chiefly at the lower end, and that in 1864, when the new footpath was being formed, the workmen discovered that from the bottom of the fissure to the line of the path the rock had been cut, so as to form an easy access to the burn, or to the gulley on the western side. All traces of the steps are now obliterated, the lower surface of the chasm being completely covered with

loose earth and stones, making the ascent or descent so difficult and dangerous that it is now scarcely ever attempted. There is a curious tradition as to the name of this strange passage. The word "score" in Gaelic signifies *a cut*. (Many of the names in the locality are of undeniably Gaelic origin.) And it was called Kemp's Score, so goes the story, because it was made—or at least largely made use of—by one William Kemp, a noted robber and freebooter in former days. This man, it is said, had committed many depredations, and at last was so daring as to invade the Royal Palace at Dunfermline and carry off the King's dinner. A young courtier who happened to be in disgrace with the king, hearing of the daring exploit, hastened after the depredator, and having slain him, cut off his head and threw his body into a deep pool on the river Devon a little way above what is now known as the Rack Mill, which pool has ever afterwards, to the present day, borne the name of "Willie's Pool." On returning to the Court with the robber's head, the young nobleman obtained his pardon and was received again into the royal favour. What foundation, if any, there is for this story, I have been unable to find out. The Rev. Dr Thomas MacLauchlan of Edinburgh, a very accomplished Gaelic scholar, has pointed out to me that the word "Kemp" in Gaelic signifies a *giant*, and that the strait fissure called by this name may have been represented in days of yore as the sword cut of some mighty son of Anak—just as we have the "Giant's Causeway" in Ireland, and other similarly-named places in our own country. It is worthy of note here in passing, in connection with this story, that the robber Kemp is represented in it as being of gigantic strength and stature.

The main entrance to the Castle, as I have said, is on the northern side. From the fosse or ditch to which I formerly alluded, and which was spanned originally by a drawbridge, a sloping ridge of earth some 70 yards long by about 40 broad, leads up to the principal gateway. The roadway which traverses this has been paved with large and irregularly-shaped flat stones, some of which may still be seen *in situ*. On this ridge there stand two very old plane trees. Originally there seem to have been more of them, one indeed having been destroyed by fire in quite recent years, the work, it is said, of a passing tramp who lit his pipe beneath its shade. One of these—the largest—is a very fine tree, remarkable

for its symmetry and size, though the gales of recent years have torn away from it one very heavy branch. It is popularly known as "The Maiden Tree," though why it has been so denominated I have been unable to ascertain. The circumference of its trunk measures from 15 to 20 feet at different distances from the ground. The popular belief is that these trees were planted by the Argyll family during their possession of the Castle, a quite probable idea, seeing that it only passed out of their hands in 1805, though another part of the story, viz., that they are as ancient as a part of the old buildings themselves, is wholly untenable.

Without going into elaborate architectural details, it may be well to indicate the general appearance of the Castle, and to give some of its chief dimensions. These have kindly been furnished to me by a professional friend, who has recently measured the ruins. The buildings of the Castle are rectangular in shape. The total frontage to the north measures (in decimals) 96.8 feet; to the south, 104.9 feet; to the west, 87.7 ft.; and to the east, 91.7 ft. The gateway (10 ft. 6 inches in height, and 7 ft. 6 in. wide) leads through a porch, 18.4 ft long, by 9.3 ft. broad, into the courtyard, which, in turn, is 74.4 ft. long from east to west, and 36.4 broad from north to south. At the north-eastern corner of the courtyard stands the Donjon keep or tower, 59. 4 ft. high at its highest part. Its walls are about 7 feet thick, and in a remarkably good state of preservation. The interior is divided into four rooms, one above the other, 27.6 ft. by 16.6 ft. In height these rooms vary from 10.9 ft. to 14.10 ft. The original entrance to the Keep is in the south-western corner, where a somewhat high but narrow door gives admittance to a short passage leading into the apartment on the ground floor. To the left of this door, and immediately within it, a steep and narrow stone stair (2 ft. 4 in. broad, and with steps each a foot high) leads to the first floor. This stair, though all along known to exist, has only been cleared out very recently. It is such that a single armed man posted at the top could effectually prevent any one from entering. Originally, access from this floor to the storeys above, was gained by a narrow spiral staircase in the thickness of the wall of the Keep, at its south-western corner. The steps of this staircase are now in a very ruinous condition, and in several places have completely disappeared. At a date subsequent to the erection of the keep, and

when the rest of the buildings were constructed, another stair of 84 steps was put up alongside it on the southern side, and entrances from it broken open into each of the different rooms. This stair is still in good condition, and is now the only means by which the keep can be ascended. The uppermost room appears to have been the principal apartment. The ceiling of this hall is finely groined, and in the centre of it are two grotesquely carved heads, forming sockets, from which, in former days, chandeliers of some sort were suspended. Off the room on the first floor there is a small antechamber, in the floor of which is the entrance to a small dungeon, 6.8 feet long, and 3 ft. 3 in. deep by 10 ft. deep. This miserable hole, of which counter parts are to be found in many castles of the same period, and admittance to which can only be had by a ladder, was probably used as a temporary lock-up for prisoners who were kept there until otherwise disposed of. In the bottom of it a quantity of small leaden bullets and a few small coins have been found. The top of the tower, which up to a comparatively late period was covered with grassy turf—the gradual growth of centuries—has now been laid with cement, and forms a commodious platform, from which an extensive view can be obtained. The lofty chimney, still extant, and the stunted remains of another, seem to indicate that the roof was originally the usual pointed one with crow-steps, as they are called. The rest of the castle is in a more or less ruinous condition, the southern portion, indeed, being little more than a mass of broken, roofless walls. The portion next the keep has been recently patched up to form a dwelling-house for the family of the man who keeps the footpath in repair, and otherwise attends to visitors. In the basement of this part there are two rooms, the ceilings of which are groined exactly like that of the principal apartment of the keep. These rooms are probably not of much later date than the keep itself, and considerably older than the rest of the castle. Beneath the southern part of the ruins, and entering from a narrow passage which runs along the courtyard on its southern side, there are five cellars, varying in size from 17·3 ft. long by 11·8 ft. broad, to 17·6 ft. long by 17·3 ft. broad. The floors of these cellars, when dug into, are found to consist largely of broken bones, and portions of lead piping for the conveyance of water have been found in them. They may have been used for the housing

of live stock for the supply of food to the inmates of the castle in time of siege.

There seem to be indications about the buildings of Castle Campbell that they belong to three different periods. The square tower or Donjon Keep—which is the principal feature of all our ancient Scottish castles—is obviously of considerable antiquity, and much older than the other parts of the edifice, although, from its superior masonry, it is in a far less ruinous condition. This is evident at once, on even the most cursory examination. But *when* exactly this Keep was erected it is difficult to say. The late Professor Cosmo Innes—a very competent authority—in his work on "*Scotland in the Middle Ages*," gives it as his deliberate opinion, after careful search and examination, that of any secular buildings in Scotland, presenting any architectural features, we have really no specimen extant older than the 13th century. "We can point," he says, "to where earlier dwellings once existed—fortalices and castles of the reign of David I., and even earlier—such as those of Stirling, Edinburgh, Roxburgh, Perth, and Forfar. At such places, as well as elsewhere, at the chief seats of the greater earldoms, March, Fife, Athole, Angus, Strathern, Mar—castles were built for security and enjoyment, at the time when such sumptuous fabrics were erecting for the Church here in Scotland, and while castles and houses were building in England for the very brothers and cousins of our northern settlers. But of such *civil* structures of this, the Norman or Romanesque period, we have only the vestiges remaining—a mass of shapeless masonry, disclosing marvellously strong mortar, or more frequently a mere foundation, faintly distinguishable through the green sward."—(p. 313.) Now, I am disposed to think that local tradition is inclined in the case of Castle Campbell, to claim for it a somewhat greater antiquity than is borne out by any facts which can be advanced to corroborate it. The usually reiterated statement is that the Donjon Keep is of the 11th or 12th century. But if Professor Cosmo Innes's opinion is entitled to any weight, this it cannot be. We do not deny indeed that there may have been a building of some sort at that early date, occupying the very same site as that which it subsequently occupied. There is proof that in the 13th century the immediate neighbourhood formed a part of the ancient hunting ground of the early Scottish Kings. There is still extant in the Register of Dunfermline, the

text of a charter of King Alexander II., of date 1236, granting the forest of Dollar to the Abbot and Convent of Dunfermline for ever. At this period the whole country from Stirling to the east of Fife was covered with a dense forest, forming the royal hunting demesne. At a very much later period large portions of the same wood still existed in the neighbourhood of the Palace of Falkland. And it was in it, you will remember, that the first act in the strange and mysterious tragedy in the time of James VI., called the "Gowrie Conspiracy," is said to have been enacted, while the King was engaged in one of his favourite pastimes. Now what more likely than that in the midst of the so-called forest of Dollar, there should exist even as early as the 13th century, a royal hunting box or seat, and that it should be situated on a spot which, as we have already seen, seems to have been specially formed to invite some such erection. It is an interesting point in this connection that, according to the old Statistical Account of 1795, several places in the old farm of Craiginnan, immediately above the Castle, were called "The Bear's Den," and "The Bear's Knowe"—while one of the loftiest summits of the Ochil range in the immediate vicinity, bears still the name of "The King's Seat," because on it the ancient Scottish Monarchs were often wont to sit, watching from so elevated a "coign of vantage," the prosecution of the chase in the valleys and woods below.

It is to this early period that tradition ascribes the bestowal of the ancient name which the Castle bore, as well as the designation of some of the points in the immediately surrounding scenery. A daughter of one of the Scottish Kings was said to have been confined here as a punishment for some grievous misdemeanour. To her place of confinement she gave the name of "The Castle of Gloom"—a name which it undoubtedly bore down to the middle of the 15th century. The two streams which flowed about it she dubbed "Sorrow" and "Care," while the hill to the eastward, which was all she could descry from her prison dungeon, has ever since borne the appellation of the "Gloom Hill," by which it is still known—while the site of the melancholy quartette was the valley of "Dolour!" This highly poetical combination, however, like so many other fanciful tales, has collapsed before the searching examination of this practical age, and a new interpretation must now be given. The name of Castle Gloom is perhaps a corruption of the

Gaelic *Chleum* or *Coch Leume*—the mad leap, though the origin of this title, is lost in obscurity. The burn of *Care* was most likely the name applied to the stream after the building of the fortalice, as it seems an easy transition from *Caer*, the common Celtic prefix for a castle and its surroundings. Dollar again is now pretty generally attributed to *Dal* a valley, and *Ard* high—the high valley, a name which its position to some extent justifies—though some derive it from the Gaelic *Doilleir*, signifying *dark, sombre, or gloomy.* Thus, alas! is the tender romance of sentiment evaporated beneath the ruthless analysis of modern etymology.

But to return to the question of the date of the erection of the Donjon keep. It is like heresy to say it, but I am much inclined to believe that its original erection is to be attributed to no more hoary period of antiquity than the 15th century—perhaps the beginning of the century. I cannot here enter on all the reasons which have led me to fix on this date, nor do I base my opinion entirely on architectural data, for judging which I confess myself incompetent. But on other grounds I think we may place its erection about the 15th century—the chief time of these towers, so peculiar to our country. These towers were evidently built after the model of the primitive Norman "Donjon," long antiquated and disused in England. Now no one can take a general survey of the ancient baronial residences to be met with in Scotland, without being forcibly struck by some national peculiarities which broadly distinguish them from the corresponding class of buildings in England. It may safely be said that there does not exist on the English side of the border even one of these curious oriental-looking, clustered masses of tall chimneys, narrow crow-stepped gables, and numerous conical turrets, which are to be found scattered all over Scotland from one end to the other. But while he notices these characteristics of the baronial residences of a comparatively later age, many of them still habitable and inhabited, the stranger will find that the deserted and ruinous castle of a preceding period, is often just such a simple rude square block as that of Castle Campbell before you to-night—reminding him strongly, if he has ever seen it, of the Norman keep or "Donjon." Here let us go back a little for a minute or two. It is necessary to keep in view the historical character of European castles generally—of feudal castles, as they have aptly enough been called. Other times and other nations have had

their fortresses, but the Castle, strictly so-called, seems to have belonged to the feudal age alone. It is not so much a work of *refuge* as a work of *aggression*. That is to say, it was raised, not by the people of the country for their protection against invaders, but by outsiders who came among them, and whether to their advantage or the reverse, held rule over them. Hence the feudal lord, who had acquired a district in possession, built for himself what was alike a dwelling-house and a fortress. This is the special peculiarity of the feudal castle. It was at once a private dwelling-house with all the few amenities which a dwelling-house had in that age, and a fortress for containing a garrison of soldiers. It is important to keep this peculiarity in view, because each tide of conquest deposited its own kind of castles, marking its epoch, just as the different diluvial deposits may mark in the science of geology, the stages in the rising or the receding of a flood. The spread of the Normans over Europe was that great inundation which first covered her with castles, and hence it is that their progress over England in the 13th century is marked by *one* baronial type, and their expansion over Scotland two centuries later. is marked by *another* and a totally different type, distinctly indicative of the changes created in the development of baronial architecture by the lapse of time. The most natural shape of a built fortress is just a square block. French antiquaries seem to think that many of the castles of their own country were begun by the Romans, and that the square Norman tower was therefore but the legitimate descendant of the Roman *arx* or citadel. If this is so, it is exceedingly curious and interesting to find that Rome has stamped her architecture on the details, if not on the actual structural character, of the earliest feudal castles, in those characteristics which are called Norman or Romanesque work. Such were the earliest castles of England. But according to Professor Innes, as I have already said, there is not one known specimen of this kind of work—I mean the early round arched work—in any baronial remains still extant in Scotland. I may add here in passing, that in this opinion he is thoroughly supported by the late accomplished antiquary Mr Joseph Robertson in a "*Sketch of the History of Architecture in Scotland*," published in the 13th Vol. of the *Archæological Journal*.

Our oldest castles in Scotland, according to these weighty authorities, are thus undoubtedly of

the later style of Norman-English. The prostration of Scotland after the so-called War of Independence is a matter well known in history. There was but little rearing of costly baronial edifices till that long struggle was over. And when the chiefs in Scotland were again rich enough to build, they had just to fall back upon the primitive square tower. Hence it is, that as has been already remarked, there are many of them throughout our land which have a very general external resemblance to the Norman keep, but which are entirely distinct from it both in historical connection, and architectural detail. We have specimens of this description in our own immediate neighbourhood, in such Castles as those of Clackmannan and Doune, and that before us to-night, the ancient stronghold of the Argylls. Generally speaking however, and as was naturally to be expected, the Scottish tower was much smaller and ruder than the Norman, and it is of course destitude of those peculiar features which form the connecting link between Gothic and Roman architecture. It was still of consequence to the Scottish noble to have flanking defences to his keep. He could not afford the princely round towers of the English Edwardian baronial period, as it is styled, but he found an economical substitute creditable to his ingenuity. By the erection of a projecting parapet on the top of the tower, an available means of attack from above was procured. At the angles, this parapet was enlarged into a sort of bastion. This is a common feature in many kinds of defensive architecture, but nowhere is it so confirmed and systematic as in the Scottish square towers of the 15th and 16th centuries. The most of these conclusions are drawn from the writings of such reliable archæologists as Cosmo Innes, Joseph Robertson, and John Hill Burton; and though not universally, are yet, I believe, pretty generally accepted, as substantially correct.

Now let me quote to you a passage from the work of the first named of these gentlemen, to which I have already referred—"*Scotland in the Middle Ages*," and let me ask you to apply it yourselves to these pictorial illustrations both of the external and internal parts of Castle Campbell, which are now before you:—"I need not describe to you the Scotch castle of that time—the single, square, gaunt tower, rising storey above storey, each floor consisting of but one apartment, the door placed high for safety, the walls thick, the window-openings narrow and

jealous. Such a dwelling, and we have plenty of them, though few in their unmitigated bareness, recalls the time when the rural baron and his family, visitors, vassals, retainers, servants, rural and domestic, lived and scrambled for their food, all crowded together in the one hall—a gloomy cold apartment—when the offal of the board was fought for by the dogs below it, and the garbage was hid among the foul straw, which might be renewed when harvest produced a supply—when the furniture was limited to the moveable boards on which the meat was served, and a few stools and settles of deal—when carpets, curtains, window glass, comfort, cleanliness, were unknown—when the women had no separate apartment but their sleeping-room, and no tastes that made such life irksome."—(pp. 315-316.)

This style of building, contrasting so unfavourably in some respects with the ruins of that which had preceded it by a century, fortunately did not continue long in its rude nakedness. As security increased, and the education and tastes of the people improved, dwellings of greater comfort were built. In many cases the old towers were preserved, and added to by extending buildings round the court-yard, till these generally came to assume the form of a mansion surrounding a quadrangle. These buildings were for the most part, tall, lean, high-roofed, single dwellings, full of small rooms and small windows. And such additions and re-additions were continually being made during the succeeding century to that of which the square towers were so marked an architectural feature. Specimens of precisely such additions are to be found represented in the ruinous remains which surround the keep of Castle Campbell to the south and south-west.

At the beginning of these early days of which I have been speaking, the Castle, as I have already indicated, was probably in the possession of the Crown. There is a tradition still current, which declares that it was a portion of the dowry which King Robert the Bruce bestowed upon his sister, the Lady Mary Bruce, on the occasion of her marriage with Sir Neil Campbell of Lochow. As this is the first mention of the connection between the Clan Campbell and the Castle of Gloom, with which they afterwards became so identified, a few words regarding the origin of the sept, may not be out of place. According to Buchanan of Auchmar's "*Inquiry into Ancient Scottish Surnames*," the first ancestor of the race was a certain Diarmuid Odui-

bhne, who crossed over from Ireland about A.D. 512, and settled in Argyllshire. From him the Clan Campbell are often designated in Gaelic song, "Siol Diarmuid," the race of Diarmid. A descendant of this chieftain, Eva Oduibhne, daughter of the Knight of Lochow, treasurer to Malcolm III., married Archibald, her own cousin, whose mother's surname was *Beauchamps*, the French equivalent of the Italian *Campobello*, which in turn is derived from the Latin *Campus Bellus*. This lady had been married by Malcolm Oduibhne, who left Scotland for France, and changed his own surname for that of his wife. A descendant of Eva Oduibhne and Archibald Campbell, was Sir Neil Campbell of Lochow. At first he sided with Edward I. of England, in his claim upon the Scottish Crown, but ultimately espoused the cause of Robert the Bruce, and was present with him at the battle of Bannockburn. He married Mary Bruce, and is said to have received with her, from her brother, the lands and fortalice of Gloom. If this tradition is at all worthy of credence, which, it may be said in passing, is very doubtful, the Castle must have subsequently gone out of the family at more than one period.

In the charter chest of the Duke of Argyll there are three charters bearing the date 9th April, 1465, which are the oldest title-deeds relating to the Castle that have come down from former ages. These sasines (for such they are) refer to the three daughters of John Stewart, third Lord of Innermeath and Lorn. This nobleman had no sons, consequently his brother Walter succeeded to the lordship and the chief part of his landed property in Perthshire and elsewhere. But the lands of "Dollar and Glum," of which he was owner,—though how he became such there is no evidence to show,—did not go with the rest of the property, but passed to his three daughters as heirs-portioners. Tht eldest of these daughters, Isabel, married Colin, first Earl of Argyll. Her sister Margaret became the wife of Sir Colin Campbell of Glenurchie, while Marion, the third daughter, married Arthur Campbell of Ottar. The two younger sisters and their husbands seem to have relinquished their shares in these lands in favour of their eldest sister, the Countess of Argyll. Her husband, who was created Earl of Argyll in 1457, was a man of eminent parts and great accomplishments, in high favour with the successive monarchs James II., III., and IV.,—being employed by them in various embassies and other important

services. And with this couple's descendants the possession of Castle Campbell remained for nearly three and a half centuries, till 1805, when the lordship of Campbell, with the ancient Castle, was purchased by Crawford Tait, the proprietor of the adjoining estate of Harvieston, and the father of the late Archbishop of Canterbury. It subsequently became the property of the Globe Insurance Company, from whom Sir Andrew Orr, the brother of the present owner, bought it in the year 1859. Between the period of the Castle's possession by the Crown and its possession by John Stewart, third Lord of Innermeath and Lorn, it seems in some way to have passed into the hands of the Bishops of Dunkeld. For in the Argyll charter-chest there are various charters and "precepts of clare constat," as they are called, dated respectively 31st January, 1493, 12th July, 1566, 8th December 1573, and 6th October, 1582, confirming the right of ownership to the Earls of Argyll, and executed by successive Bishops of Dunkeld. Another interesting charter in the same repository is one by King James IV. in May, 1497, confirming in turn, the first of these Bishop's charters executed in 1493. In a still earlier deed, of date April, 1465, the lands of "Dollar and Gloom" are described as forming part of "the Barony of Dunkeld." All along, indeed, the Bishops of Dunkeld appear to have been superiors of the parish, and the family of Argyll held many of their lands here in feu from them. It was in the year 1489, as we find it recorded in the Scottish Acts of Parliament, that the Earl procured an Act of Parliament changing the name of the castle from that of "Gloom" to the patronymic of his clan, by which it has ever since been known. I have seen it stated more than once that Castle Campbell was given by William Shevez, the Archbishop of St Andrews from 1478 to 1496, to the head of the Clan Campbell as a bribe to secure his support upon a special occasion. This, however, is a mistake, the origin and true version of the story being this :—In the year 1491 there arose a fierce dispute between Shevez and Robert Blacater, the Archbishop of Glasgow, concerning pre-eminence. "The business," says a chronicler of the period, "begat heat, and came to some height." The opposing prelates were befriended by various factions of the clergy and nobility, and the whole kingdom was for long disturbed by the contest. It was at this time that Archbishop Shevez "gave a permanent and very advantageous lease of the

Archiepiscopal estate of Muckhart"—a separate barony lying in Perthshire, immediately to the east of the parish of Dollar—"to the Earl of Argyll, on the condition of obtaining his powerful interest in the said quarrel." The facts are stated In the *Reliquiæ Divi Andreæ*, published by George Martine in 1683, where the exact words used are these,—"It is reported that Muckhartshire was then feued out by Shevez of St Andrews to the Earl of Argyll, for siding with him: and I have heard that the first feu-charter thereof was granted at Dollar Castle, now Castle Campbell, then and still a house belonging to Argyll."

The next mention of this ancient stronghold to be met with in the records of authentic history, is to be found in the life of John Knox. In the summer of the year 1556 he paid a visit to Castle Campbell. Having been summoned to Geneva by the English congregation there, who had chosen him to be one of their pastors, he decided to comply with the invitation, and, preparing for the journey, sent his wife and mother-in-law before him by sea to Dieppe, while he himself visited and took leave of several of his friends. Here is his own account of his movements at this time, from Book I. of his "*History of the Reformation in Scotland.*" "He himself by procurement and laubouris of Robert Campbell of Kingzeanclewch, remaned behynd in Scotland, and passed to the old Erle of Ergyle, who then was in the Castell of Campbell, whare he tawght certane dayis. The Lard of Glenurquhare (which yit liveth), being one of his auditouris, willed the said Erle of Ergyle to reateane him still, but he purposed upoun his jorney, wold not att that tyme stay for no requeast, adding 'That yf God so blessed thei small begynnynes, that thei continewed in godlynes, whensoever thei pleased to command him, thei should fynd him obedient; but said 'That ones he must neadis visit that lytil flock which the wickedness of men had compelled him to leave.' And so in the moneth of Julij he left this realme and past to France, and so to Geneva." *(Laing's Edition of Knox's Works, vol. I., pp. 253-254.)* The "Old Erle" here referred to, was Archibald the fourth Earl of Argyll. This nobleman was of very considerable ability, and evidently of a decidedly religious character. He began life, and continued for long, a loyal adherent of the Roman Catholic faith. As a proof of this it may be mentioned, that in the Inverary charter chest there is still preserved a charter, granted by Cardinal Beton, Archbishop

of St Andrews, on the 17th of August, 1543, in which the lands of "Balrudry, Pitgogar, and Blairhill, in the barony of Muckart," are bestowed upon him, "in consideration," so the deed proceeds, "of the great benefits, assistance, counsels, and services rendered by the Earl to the Cardinal and the Church, and especially for the protection and defence of ecclesiastical liberty at that dangerous time, when Lutheran heresies were springing up on every side and striving to weaken and subvert ecclesiastical freedom; and for the like services to be rendered to the Church in time coming." In reference to this last sentence, I cannot help remarking that if Cardinal Beton's gratitude to the Earl was "a lively sense of favours to come," he was doomed to be grievously disappointed. For the Earl is said to have been the first person of importance among the nobility of Scotland who embraced the Protestant religion—becoming thereafter a strenuous promoter of the Reformation movement. At the time of Knox's visit, he must have been far advanced in life, and he died two years afterwards, in 1558, adjuring his son upon his deathbed, to use his utmost influence for the suppression of the old religion, and the preservation and advancement of the Reformed faith.

It appears from the above statement from Knox's History, that while visiting Castle Campbell the Reformer preached and taught there. It is also quite possible that the popular belief that he administered the Sacrament of the Lord's Supper within its walls, is correct. Various tales are afloat in the district regarding his sojourn here, such as that, for example, which declares that he preached about this time to a large congregation from the brow of the hill on the east side of Tillicoultry Glen, where there is a natural rocky formation somewhat resembling a pulpit. Did time permit, some amusing stories might be told of the origin of some of those apocryphal traditions, which, like the famous description of a camel by a German professor, who had never seen such an animal, have been evolved out of the authors' own inner consciousness! The tradition so universally and implicitly believed in the vicinity, which identifies the very spot on the green sward in front of the Castle as the scene where the ordinance was dispensed, and even gives the neighbouring piece of old masonry, formerly described, the name of "John Knox's Pulpit," is the offspring of pure imagination. The late Dr Andrew Milne, the writer of the "New Statistical

Account of the Parish," says very truly with reference to this—"This is certainly going too far; for field preaching and dispensing ordinances in the open air, though common (enough) afterwards, was then quite unknown."

Like almost every other castle of importance within her realm, of course Castle Campbell was visited by Mary Queen of Scots. This happened twice in her brief but eventful reign, once when she came on a peaceful errand, and once on a warlike one. She came hither from Edinburgh first of all, to attend the marriage of Margaret, the half-sister of Archibald, fifth Earl of Argyll. This lady, who was the eldest daughter of Archibald, the fourth Earl—Knox's venerable patron and friend—by his second marriage with Margaret, daughter of William Graham, Earl of Menteith, was married in the Castle (probably in the principal apartment in the Keep) on the 10th of January, 1563, to James Stewart, ancestor of the Earls of Moray, Commendator, or Secularised Abbot of St Colme's, and subsequently created Lord Doune. The son of this couple became in after years "The Bonny Earl of Moray" of Scottish history and song, who was so cruelly murdered by the Earl of Huntly at Donibristle in 1592. On this occasion Queen Mary remained for four days the guest of the Argyll family, returning again to Edinburgh on the 14th of January. This 5th Earl of Argyll was himself married to Lady Jane Stewart, the illegitimate half-sister of Queen Mary, who was present with her in Holyrood when Rizzio was murdered in March, 1566. At first he espoused the cause of the Queen, and though, as we shall see immediately, he probably vacillated somewhat between her and her opponents, and is even said to have intrigued against her in the interval, yet he commanded Her Majesty's forces at the battle of Langside in 1568. The student of this portion of Scottish history cannot fail to be struck with the utter want of coherency and consistency in the conduct of the leading nobles. And Argyll was no exception. This nobleman's estrangement from his wife, and their disreputable conduct in consequence, was a matter of concern to the Queen, who actually condescended, at a memorable interview with John Knox near Kinross on the 14th of May, 1563, to entreat her arch enemy to use his influence in promoting a reconciliation between them, and the amendment of both their lives. Subsequently the Earl appears to have sided with Moray and the other noblemen who

were opposed to Mary's marriage with Darnley. And this leads me to refer now to a stirring incident in the life of Queen Mary, in which Castle Campbell is said to hold an important place. In June, 1565, Mary, with Darnley, to whom she was now betrothed, was residing at Perth. It was known that she had promised to be present on Sabbath the 1st of July, at Callendar House, near Falkirk, at the baptism of the child of the Earl of Livingstone, and that she would proceed thither by the old road through Glen Farg from Perth to Queensferry. A conspiracy is said to have been entered into between the Earls of Moray, Argyll, and Rothes, and the Duke of Châtelherault, to waylay her and Darnley in the neighbourhood of Kinross, to carry her to St Andrews preparatory to imprisoning her for life in Lochleven, and Darnley to Castle Campbell, with a view to deliver him ultimately into the hands of Queen Elizabeth. In pursuance of this scheme Moray kept watch in his mother's Castle of Lochleven; Argyll remained at Castle Campbell, whence he was to descend with his retainers at the appointed time; Rothes lay in wait at the Parenwell, while the Duke was stationed at Kinneil, near Queensferry. This elaborate conspiracy proved abortive, however. Mary somehow received intelligence of the trap that was laid for her, and starting with Darnley at a very early hour of the morning, accompanied by an escort of several hundred mounted spearmen, she traversed the country with great speed, and without drawing bridle reached Callendar House in safety, before the conspirators knew of her departure from Perth. "She had used no more haste, however," says Miss Strickland, "than the urgency of the case required; for two hours only after she had passed Lochleven, Argyll came down from Castle Campbell with his force, thinking, as he deceitfully remarked, to meet Her Majesty on that spot, and that she would take her dinner with my Lord of Moray at Lochleven Castle." *(Queens of Scotland, vol. IV., p. 150.)* Of this very remarkable story, Hill Burton remarks, —"It would not be difficult to believe in such a conspiracy, if tolerably well vouched, but there is scarcely a vestige of evidence in its support." *(Hist. of Scotland, IV., 276.)* There are numerous reasons for discrediting it indeed, though a very minute account of it occurs in a letter of Randolph to Cecil, of date 4th July, 1565, preserved in the State Paper Office, in which, however, it is referred to as "a false rumour;" and even John Knox makes a pass-

ing allusion to such a plot in his "History of the Reformation." Whether well founded or not, it is quite plain that at the time, its existence was widely and currently reported.

At the beginning of September of the same year (1565) Mary and Darnley, to whom she had been married in the interval, attended by two companies of infantry from Edinburgh, started from Stirling to go into Fife. On her way she summoned Castle Campbell, her rebel brother-in-law's stronghold, to surrender to her. This was on the 8th of September. And the summons appears at once to have been obeyed. Here is what Knox says of it in his History, (Book V.);—"In their passage (they) caused to take in Castle Campbell, which was delivered without impediment to the Lord of Sanquhar." Chalmers in his life of Queen Mary (II. 151) says—"On the same day, (8th September,) Lord Sanquhar, with a detachment of the royal army, took Castle Campbell, the guilty fortlet of the Earl of Argyle." How long it remained in the possession of Mary and her party it is impossible to say, But probably it was not long. For shortly after this the tide of fortune set in strongly against the unfortunate Queen, and culminated in her confinement at Lochleven, her escape therefrom, and her final defeat on the fatal field of Langside. The Earl of Argyll once more changed sides in the interval, being instrumental, it is said, in procuring Mary's liberation from Lochleven, and commanding her forces at Langside in May 1568.

During the next eighty years, there is no mention made of Castle Campbell in any public historical record, and any glimpses of it that we can obtain are only to be had from private deeds. Colin, the sixth Earl, bestowed "the ten pound land of Dollar, with the fortalice of Campbell," upon Dame Annabell Keith his Countess, and the widow of the Regent Moray, in liferent,—a gift which was confirmed by James, Bishop of Dunkeld, in a charter still extant in the family charter chest, of date 6th October, 1582. Up to 1605 the land attached to the Castle, and including most of the parish of Dollar, was retained in the hands of the proprietors. But in that year it was all feued out by Archibald, seventh Earl, and Anne Douglas his wife, reserving only the Castle itself and two farms in its immediate neighbourhood.

The next authentic historical record of Castle Campbell is the account of its destruction by fire in 1645. And here a few words are needful, explanatory of the circumstances under which this event took place.

During the lamentable civil war which distracted our country during the reign of Charles I., and the Commonwealth, the gratification of private revenge, and the settlement of family quarrels, largely influenced the combatants on either side. Between the clans Graham and Campbell, a feud had existed for a long time, and also between those of Campbell and Ogilvie. The Grahams and Ogilvies espoused the side of the King, and the Marquis of Argyll was sent by the Committee of Estates to take and destroy the seat of the Earl of Airlie, the head of the latter clan. This he accomplished most effectually, a contemporary writer recording that Argyll "was seen taking a hammer in his hand, and knocking down the hewed work of the doors and windows, till he did sweat with heat at his work":—*(Gordon of Rothiemay.)* It is on this incident that the old Scotch ballad is founded, "The Bonnie House o' Airlie," which relates that,—

> "It fell on a day and a bonnie simmer day,
> When green grew aits and barley,
> That there fell out a great dispute
> 'Tween gleyed Argyll and Airlie."

This occurred in 1640, and it was not until five years afterwards that an opportunity of taking their revenge was afforded to the Ogilvies. After he had twice defeated the Covenanting forces at Auldearn and Alford in the summer of 1645, the Marquis of Montrose descended upon the shires of Fife and Kinross, and moved westward with the view of menacing Stirling. He had in his army a host of wild Irish caterans, and numerous representatives of the Highland clansmen, while among his chief officers was the Earl of Airlie. As he passed westward through the valley of the Devon towards the end of July or beginning of August, he passed the stronghold of his great enemy Argyll, and the temptation to lay siege to it and destroy it, was too strong to be resisted. The Castle was taken and the greater part of it devoted to the devouring flames. The parties in his following who were most active in the work of destruction were the Ogilvies, the retainers of the Earl of Stirling and of Graham of Braco, whose respective houses of Menstrie and Airthrey had shortly before been burnt by order of the Marquis of Argyll, and the Macleans, who had long-standing feuds with the Campbells in Argyllshire, and who are said to have done the actual work of firing. It has been sometimes remarked that the resistance offered to this assault by the keepers and inmates of the Castle must have been surprisingly

slight, since it was well fitted by its situation and otherwise, to offer a stubborn and lengthened resistance. But tradition supplies a version of the affair, which so far explains this. It is said that there was in Montrose's army a young man who had formerly been in the service of the Argyll family, but who had been dismissed for some misdemeanour. This man was well acquainted with the arrangements of Castle Campbell, and directed the besiegers to the place in the outer wall where, by displacing the masonry, they got access to the socket into which the strong bar or bolt which secured the main gate was drawn back when it was opened, and drawing it out effected an easy entrance. The place in the wall to the left of the outer gateway where this was done, is still visible. And whether of more recent handiwork or not, certainly the stonework at this point bears all the appearance of having been disturbed. Ever since this catastrophe, the Castle has remained a mass of mouldering ruins. From time to time small relics have been picked up in and around these, leaden bullets, clay pipes, coins, glazed tiles, fragments of window-glass, keys, spurs, and the fittings of massive doors, such as are exhibited before you now. Many of these were found lying beneath masses of charred and burnt wood, the remains probably of the fallen-in roofs. So far as I can ascertain, nothing of any value has as yet been met with, though I have little doubt that careful and judicious exploration might bring to light much that would be very interesting. Besides Castle Campbell, Montrose, in his progress, burnt every house in the parishes of Dollar and Muckhart, the inhabitants being vassals of Argyll. Two alone escaped, one in Muckhart, which Montrose's followers mistakenly supposed to be in the neighbouring parish of Fossoway; and one in Dollar—still pointed out in the "Old Town"—which they were led to believe belonged to the Abbey of Dunfermline. This act of revenge occasioned great suffering and want in both parishes, and the inhabitants petitioned Parliament for assistance. Their petition asked "present mantenance for manuring the ground, and interteining the lives of them, their wyfes, children and families, in respect that their whole houses were burnt, their cornis destroyed, their beastiall and plenishing taken away," and in another and similar petition presented in 1649, all this is said to have been done, "by the enemys of this kirke and kingdome in the rebellioun of James

grahame and bloodie Irishes with him." The matter was referred to a committee. On their report, an Act of Parliament was passed, dated 25th December, 1645, granting warrant to the lairds of Sauchie, Duncrub, and Cleish, together with one James Crichtoun of Wester Aldie, to cut down wood at Hairshaw, the property of the Laird of Rossyth, "presently incarcerated as a delinquent," to be given to the people of Dollar and Muckhart to repair their houses with. In addition to this a sum of twenty thousand merks was entrusted to the care of the Marquis of Argyll to be distributed amongst the most necessitous. About a year after this, on the 20th November, 1646, another Act of Parliament was passed, ordaining "the supplicants of the Parishes of Muckhart and Dollar to be free of maintenance and quarterings for the Lands and Baronies of Muckhart and Dollar, and discharging the inhabitants of the same, and all exacting of maintenance money from the heritors, tenants, inhabitants, and possessors of the same." It is very doubtful, however, if they ever received the money voted to them, as up to June 1651 we find them repeatedly petitioning Parliament for its payment.

In connection with the destruction of Castle Campbell, I may here allude to a ballad which is said to have been formerly very popular in its neighbourhood, and which professes to describe an incident of the siege. The piece in its main features bears a close resemblance to one of the oldest ballads in our language—"*Edom O'Gordon*," first printed in Glasgow in 1755, and which is founded on an incident which occurred in Aberdeenshire in 1571. The ballad, however, has long been current in various localities both in Scotland and England, with the proper names changed to suit neighbouring scenes. A modern authority in ballad literature says of it, "Other names of the places and persons mentioned differ in the different versions." *(Allingham's "Ballad Book," Note, p. 374,)* The following version, applying to Castle Campbell, is undoubtedly of considerable antiquity, and contains a number of very interesting variations from the original ballad. You will notice that "Lady Campbell" is represented in it as upbraiding one of the besiegers "that kens the key o' the stane," for his cruelty and ingratitude—having formerly received kindness at the hands of her husband and herself. Perhaps this part of the ballad, which occurs—with slight variations—in all the versions of the original "*Edom O'Gordon*," may have occasioned the local

tradition about the capture of the Castle, to which I have just alluded. It used to be often recited and sung by the people of Dollar between 70 and 100 years ago. I received it from a gentleman who is himself a native of the parish, and who took it down *verbatim et literatim*, from the lips of an old woman, now many years ago.

" It fell aboot the Martinmas time,
When the weather was chill and cauld,
Said Adam o' Gordon to his merry men
' Where shall we draw to some fauld ?

I think we'll go over to Castle Campbell,
The good lord's far awa' ;
I think we'll go over to Castle Campbell
And ye my merry men a'.

Lady Campbell look'd over her window
All in a dress of black,
And there she spied Adam o' Gordon,
And all his merry men at his back.

' Go lock the doors, go bar the gates,
Go bring the keys to me.'
They've lock'd the doors, they've barr'd the gates,
And brought the keys to she. *(Sic.)*

The dinner was na' weel set doon,
The grace was hardly weel said,
When Adam o' Gordon and a' his merry men
Stood at Lady Campbell's gate.

' Come doon the stairs, Lady Campbell,' he cried,
' Come even to my hand :
For to-night ye shall serve my body,
Ye shall serve at my command.'

I winna come doon, I'll no' come doon,
For neither lord nor loon,
I winna come doon for ony sheep-stealer,
That ever rode thro' lan'ward toon.'

' We neither meddled your sheep, madam,
Nor did we yet your horse,
But ere to-morrow at twelve o'clock,
Ye'll be burnt as sma' as dross.

O ! Johnnie the mason ye'll gang up,
That kens the key o' the stane,
O ! Johnnie the mason ye'll gang up,
And ken'le the flames on them.'

' O ! woe be to ye, Johnnie the mason,
An ill death may ye dee,
For I got ye a false young child,
I nurs'd ye on my knee.'

' O ! weel do I mind o' your kindness, madam,
When your good lord paid my fee,
But noo I'm ane o' Gordon's men,
I maun either do or dee.'

The flames were kindl'd on every side,
The sparks flew wondrous high.
Up spak the auld daughter to her mother,
It's here where we must die,

I once was contrac' to an English lord,
But wedded I never shall be;
I once was contrac' to an English lord,
But a wedding I never shall see.

Gae row me in a pair o' clean sheets,
And tow me owre the wa',
That a' my frien's may see and hear
That I hae gotten a fa'.'

They've row'd her in a pair o' clean sheets,
And tow'd her owre the wa',
When ane o' Adam o' Gordon's men
Kep't her on a spear sae sma'.

They've separated her heid frae her fair bodye,
And the tates o' her yellow hair,
And they threw it up to her mother again,
And oh! but her heart it was sair.

Then up bespake the eldest son
As he stood by his mother's side,
'If I were in yonder field, mother,
Wi' a bent bow in my hand,
It's I would fight for you, mother,
As long as I'd life to stand.'

Then up bespake the wily nurse,
With the young babe on her knee,
'It's throw them doon the keys, madam,
Or the bonnie bairn will dee.'"

One of the latest historical references to Castle Campbell occurs in connection with the Jacobite rebellion of 1715. On the 23rd of October of that year and some three weeks before the battle of Sheriffmuir, a party of soldiers, consisting of two hundred foot, and one hundred horse, were dispatched by the Earl of Mar from the neighbourhood of Auchterarder to lay the town of Dunfermline under contribution. In contemporary records it is mentioned incidentally that they marched by way of Castle Campbell, probably by Glen Eagles and Glen Quey, and lodged for the night in a village in its vicinity, which can have been none other than Dollar. There they were taken by surprise the next morning—most of them in bed—by an officer of the Duke of Argyll. Several were killed and wounded, and seventeen taken prisoner, several of whom were persons of importance.

I find that in 1734 Castle Campbell was for a time employed as a prison for the confinement of two parishioners of Muckhart, who forcibly resisted the ordination of the Rev. Archibald Rennie, an unacceptable presentee, who was only settled at last with the aid of a military force.

The ruins of the Castle and their romantic and picturesque surroundings, have often been visited and described by admiring tourists. Among the chief of these of whom any notice need be taken,

are Thomas Pennant in 1769; *(Tour in Scotland.)* John Stoddart in 1799, *(Remarks on Local Scenery and Manners in Scotland)*; and Dr John Macculloch about 1811. *(Letters to Sir Walter Scott on The Highlands and Western Isles of Scotland.)*

Such is a very rapid survey of the history of this interesting fortalice of former days. In tracing it out, I have consulted every source of information that I thought was likely to throw any light upon it, and I have tried to distinguish between the fanciful and merely traditional, and what we may with safety believe to be authentic. In addressing moreover such a society as this, whose aim I apprehend, is rather the elucidation of facts than the cultivation of sentiment, I have left out all poetry and sentiment, for which, as you can believe, there is abundant room on such a theme. But I will conclude my paper by quoting the beautiful lines of the Baroness Nairne on the old Castle which has been its subject.

CASTELL GLOOM.

Oh, Castell Gloom! thy strength is gone,
The green grass o'er thee growin';
On hill of Care thou art alone,
The Sorrow round thee flowin'.
Oh! Castell Gloom! on thy fair wa's,
Nae banners now are streamin';
The houlit flits amang thy ha's,
And wild birds there are screamin'.
Oh! mourn the woe, &c.

Here ladies bright were aften seen,
Here valiant warriors trod;
And here great Knox has aften been,
Wha feared nought but his God.
But a' are gane! the gude, the great,
And naething now remains,
But ruin sitting on thy wa's,
And crumblin' down the stanes!
Oh! mourn the woe, &c.

The lofty Ochils bright did glow,
Tho' sleepin' was the sun;
But mornin's light did sadly show
What ragin' flames had done!
Oh! mirk, mirk, was the misty cloud,
That hung o'er thy wild wood!
Thou wert like beauty in a shroud,
And all was solitude.
Oh! mourn the woe, oh! mourn the crime,
Frae civil war that flows;
Oh! mourn Argyll, thy fallen line,
And mourn the great Montrose.

The usual monthly meeting of the Stirling Natural History and Archæological Society was held in the Smith Institute on Tuesday evening, 2d

December, Mr Croall presiding. The minutes of November meeting having been read by Mr Chrystal, secretary, and approved of by the meeting, Mr Sword read a paper which had been prepared by Croall entitled "Notes on the Polypifera." A number of beautiful specimens of zoophytes were laid on the table for examination, and minute specimens were exhibited under the microscope. Mr Croall's paper was further illustrated by diagrams. At the close, Mr Gentleman proposed a vote of thanks to Mr Croall, which was heartily accorded. This concluded the business.

NOTES ON SOME OF THE POLYPIFERA.

Paper by Mr Croall.

When we examine the numerous tribes of human beings that tenant our earth every one seems to present some feature or property of interest peculiarly its own; whether we admire the unweildy strength of the mighty elephant, or the beautiful adaptation of parts in the tiny animalcul that flies like a meteor across the field of the microscope.

It is under the impression of such feelings as these that we have selected the above subject for a few remarks on the present occasion. The Polipifera are a tribe of beings, minute, indeed, but not the less interesting, whose history is by no means perfectly understood, although we almost daily see their operations, and are more or less familiar with their stupendous structures, and although they exist and their works are carried on almost close to our homes, and whose beautiful, often tree-like and flower-like structures are objects of admiration to the most ignorant, as well as to the most learned, to the merest savage, as well as to the most civilised. It is not my intention to occupy your time at present with a general history of these minute entities, or to detail all the curious anecdotes either of themselves or their historians; but merely to illustrate a few interesting circumstances in their life history, and notice a few remarkable peculiarities exhibiting some very remarkable and peculiar conditions of their being, referring to a few species found in greater or less abundance in our own neighbourhood, and the details of which may be verified by any one who has a little leisure to collect, and some patience to investigate their curious economy.

Although of late years great changes have been taking place in the arrangement and nomenclature of the various tribes, and much important informa-

tion has been obtained in reference to their habits and economy, there will be no necessity to refer to these in the few remarks we have at present to lay before you on the habits and economy of a few of the species.

Although many of the facts, which we shall have occasion to notice, may be familiar to some, yet there may be others to whom they may be new, and the indulgence of the others, we have no doubt will be readily granted, when it is remembered that the object of meetings is not only the collection of new facts, but also the popularizing of those already known, in order to awaken an interest in further investigations, with a view to the discovery and elucidation of others.

The term Zoophytes was applied, in part, to the objects to which we propose to refer, either on account of their resembling real plants, while they possessed the properties of animals or from the erroneous views entertained by the earlier historians that they did partake both of the nature of animals and plants—a doctrine now sufficiently refuted by the careful researches of modern investigators. It was only about the middle of last century that the vegetable nature of zoophytes began to be doubted; till then they had been classed by every succeeding botanist among the lower ranks of vegetable life, and had been described along with seaweeds and mosses previous to that period. No zoologist ventured to raise a doubt as to the propriety of the arrangement, or make a single effort to bring them within the province of his own study; or if anyone did venture to whisper a solitary conjecture as to their real nature, it died away almost in the utterance, or at least was never repeated as a subject to awaken inquiry.

The theory of their vegetable nature and origin obtained its chief support from the delicate plant-like forms of the parts of their structure, which were most conspicuous—little or no attention had as yet been paid to their chemical composition, or to the habits and economy of the tiny and obscure inhabitants, whose very existence was as yet hardly known, even to the few, and when first discovered they were believed to be the flowers of the plants on which they were found.

The powers of the microscope were then only beginning to be developed, and without the aid of this handmaid of natural science, the nature and economy, *nay*, even the very *existence* of beings, so minute and so sensitive to the smallest disturbance

from external objects, might have long, if not for ever, remained a conjecture.

The calcareous or horny skeletons of many of the species, designated polypidoms, and not the animals themselves, being then the only parts with which naturalists were at all familiar, as being the only parts readily observed by the naked eye. So delicate are many of these structures and so much in accordance with the forms and habits of the vegetable tribes, that one hardly wonders at the mistake, and if we consider the means of examination then at command, our wonder will be still less at their being considered the result of vegetative power rather than the works and habitations of animated beings.

Ovid, the poetical historian of the ancient Romans, seems to have pictured the amount of the knowledge possessed by his countrymen on this subject at the time in which he lived, when he says—

"Sic et corallium, quoprimium contiget auras,
Tempore durescit, mollis fuit herba sub undis."

"The coral, though at first a soft plant under the water, no sooner comes in contact with the air than it becomes hardened." It is a circumstance worthy of notice that the hardest and most stoney corallines are frequently those growing in deep water or farthest from the influence of the air.

The greatest opposition to a belief in the vegetable nature of corallines seems to have arisen from the MINERALOGISTS, who described them "as mere concretions of calcareous matter agglutinated together and moulded together into the forms of trees and plants, by crystalization, or by the incrustation of lime on real sea-plants." Even so late as the last century, both the vegetable and mineral theory found powerful advocates in the two well-known naturalists, Dr Parsons and Mr Henry Baker, each of whom opposed the animal theory with equal pertinacity.

The learned doctor seems to have considered the animals discovered by Peyssonel as mere accidental setters—having nothing to do in the structure of their own dwelling, which had been prepared for them by "the more sure laws of vegetation." "It would seem to me," says he, "more difficult to conceive that so fine an arrangement of parts—such masses as these bodies consist of, and such regular ramifications in some, and such well contrived organs to serve for vegetation in others, should be the operations of little poor, helpless jelly-like animals rather than the work of more sure vegeta-

tion." The doctor seems here to have forgot that shells no less beautiful and varied and equally as indurated as corallines, were the work of animals, hardly, if at all, less feeble and jelly-like than those discovered in the cells of some corals and formed of the very same substance.

Mr Baker, with no less boldness, but with no better success, maintained their *mineral* origin.

The progress of truth, however, might thus be obstructed, but it could not be totally arrested; the stronghold of error had been shaken and was soon to be totally overthrown, and by a member of that very Society which had but so lately listened with apparent credulity to the opposite doctrine.

John Ellis, a merchant in London, had devoted much of his leisure time to the study of Natural History, and his attention had first been attracted to zoophytes as marine *plants*. But the energies of a master mind do not permit it to rest satisfied with *appearances* and *similitudes* He would soon perceive that their structure differed very materially from other vegetables, and being a member of the Royal Society, and more than likely acquainted with the opinions lately advocated there, he was thus led *not to speculate* and *oppose*, but to *examine* and to *prove* either the truth or falsehood of either theory.

The researches of Ellis appeared to have been conducted with so much patience and ingenuity, and were brought forward with so much candor and fairness, that the untenable opinions hitherto held soon gave way before the irresistible force of truth, and the animal nature of these bodies has ever since been almost universally held as incontestibly proved, even by those who had been the strongest advocates for their vegetable or mineral origen.

Since the days of Ellis, very little new on this subject has been discovered, although some new subdivisions in the different families have been suggested; we shall, therefore, not dwell longer on this part of the subject, but endeavour to point out some of the more interesting habits and peculiarities of some of the more common of the species.

There are *three* obvious characteristics, by which these animals may be readily and easily distinguished. The first will consist of those that have no horny or caliarevus skeleton, but are entirely composed of a soft gelatinous body, resembling that of the mollusc of the shell-fish. The second will include those which have a horny skeleton, either internal or external, and the third those whose skeleton, internal

or external, is entirely composed of calcareous matter.

These horny and calcareous skeletons appear to have the same, or even a somewhat closer relation to the animal inhabitant, than the mullusc has to its shell, and certain it is that neither can exist without the other.

There are, perhaps, few objects more worthy of admiration, than a colony of these tiny architects in the full enjoyment of life and activity, but their extreme sensibility to any movement in the surrounding medium and their great minuteness renders it exceedingly difficult to study them in their native element.

The first thing that arrests our attention in the greater number of species, is the great beauty and the exact symmetry of all the various parts of the animal and its skeleton, and this coupled with the most wonderful variety in its form and structure.

The most common species throughout the country, and which is most likely to be found in this neighbourhood as well, although stagnant pools and ditches suitable for its habita are by no means common, is the *Hydra viridis*. This species is interesting as being, on account of its abundance perhaps, not only the first of the tribe to induce the conviction that this, and most likely all other polypifera, were, in reality, subjects of the animal and not of the vegetable kingdom, but from those curious and almost incredible naratives of facts, given by the early experimentalists. These narations are so astonishing that we almost feel inclined to doubt the testimony of the investigations, and we need not wonder if, when given to the world, on the unassuming authority of a single individual, they were scouted by the thoughtless as the wild vagaries of a dreaming fancy, and treated by all with cold indifference and incredulity.

They were too startling, however, to remain long untested by experiment, and the views and conclusions of Trembly were soon authenticated by the testimony of such unquestionable evidence that doubt in any reasonable mind was out of the question.

You have heard of the giants of old with their hundred heads—this is no uncommon character among the Hydra family, and hence the name which has been assigned to them. You have heard of races of men and of animals springing from the inanimate remains of the slaughtered victims; but these vagaries of the old world poets are all but

realised in the history of the Hydra. You may possibly have heard of the unteneble, because as yet unproved, doctrine of spontaneous generation, perhaps the nearest, and by no means a world wide, approach to this, may be daily witnessed in the extraordinary reproductive powers of the Hydræ and the Actiniæ. These animals are not furnished with the horny or calcareaus skeleton, which forms so interesting and beautiful a part of the structure of some of the other species, and they are thus constantly exposed to injury from those who are not members of the society against cruelty to animals, or in the case of the fresh water species, to be crushed to pieces by the unwary foot.

The all wise and beneficent Creator, however, has not placed it there, without providing for its safety—crushed it may be but not destroyed—cut to pieces, but not deprived of the principle of life—for so long as a fragment of the animal remains entire, the energies of life will continue to be developed, and if the animal be cut in two—three or even a hundred parts, each part will not only continue to live and move, but will in a very short time assume the form and exhibit all the propertes of the parents; and if the arms or feelers are cut off, these in a short time, will be reproduced, if a section is made dividing it horizontally into two or more parts, the portion containing the mouth, will continue to seize, devour and digest its food as if nothing had happened and the basal half will soon become furnished with tentacula and a mouth like its better half, and perform all the functions necessary to its existence. If two or more sections are made in this direction each part will speedily be furnished with a mouth and feelers of its own, and even these portions will sometimes have them develloped at both ends, and thus an animal will be formed with two mouths, each cattering for a common stomach, which thus receives a double supply—even the slender, worm—like feelers, when detached from the body, will continue to enjoy the principle, until all the parts necessary to the perfect animal are gradually develloped, and a complete animal is formed from a mere fragment of animated matter. Nay so little injury or inconvenience does this mangling (as we may call it) occasion to the animal, that if it does not really enjoy it, the vital principle seems rather thereby to be stimulated, and this extraoadinary faculty of reproduction to be brought into more active exercise. Wonderful as these remarkable accounts of Trembly may appear, and incredible as

they must have seemed, when first made known to the world, they are equalled, if not exceeded, by the following experiment by the same patient philosopher.

By a very careful and delicate manipulation, Trembly succeeded in turning one of these animals inside out, when instead of its languishing and dying, as might reasonably have been expected, it was no sooner left at liberty than it resumed its former activity in search of food, which it devoured with the same avidity, and digested with the same apparent facility, as if nothing had happened to interrupt its enjoyment.

If possible, a still more remarkable circumstance in the history of this animal is narrated by Trembly, and which in a striking manner exhibits the extraordinary power possessed by the animal of accommodating itself almost to any circumstances under which it may be placed, and points us to the infinite power of the Great First Cause, who has furnished his universe with an endless variety of animated existences. These creatures are so numerous in every warm pool during the summer months, that it is not strange if contests arise between them for the minute animalcules that happen to pass their way. The same experimentalist give us the following anecdote, which strikingly illustrates this peculiarity.

Two hydræ had seized the opposite extremities of a small worm, and both were determined to retain their hold of the delicious morsel. Each continued the process of engulfing its respective share of the prey, until they met face to face in the centre; now came the tug of war,—now was the moment to test the survival of the fittest. Trembly supposed, that the smaller and weaker of the combatants would now have given over the contest, and disgorging his share of the spoil, left it to be appropriated by his more fortunate rival, but no,—determined to hold on to the bitter end, he stuck to his right until completely enveloped in the capacious body of his more powerful adversary; but here, however, he seems to have suffered no greater inconvenience than a temporary captivity, in this strange prison-house; for after the lapse of an hour, he was again liberated from the cell, no less lively than before, and immediately began to cast about for some fresh victim to satisfy the calls of his voracious appetite, only somewhat sharpened by his late disappointment.

Such, however, does not always seem to be the

good fortune of the prisoner, for Trembly informs us that he had succeeded in drawing one of these animals inside another, when the two completely coallesced, forming but one animal, having no remains of its former dual existence than a greater number of tentacula that now surrounded the mouth.

There seems to be something remarkably fatal in the grip of these soft, jelly-like and otherwise apparently powerless creatures, for no sooner does a worm or an insect come within their grasp than it instantly dies, apparently without a struggle. Worms are well known as being remarkably tenacious of life, and will survive after cuts and bruises of no ordinary kind. Yet worms that have been forced from the Hydra's almost on the instant of seizure have been observed to die very soon afterwards, and that without a single exception, and yet no teeth or analagous organs have yet been discovered in the polipus, even with all the powers of the microscope, now available for the purpose.

The monthly meeting of the Stirling Natural History and Archæological Society, was held in the Lesser Public Hall on Tuesday evening, 3d Feb. There was a large attendance. The Rev. Mr Goldie, who presided, in the course of his opening remarks, expressed his sympathy with their esteemed president, Mr Croall, in his severe illness. He was sure all present would be glad to know that Mr Croall was recovering, although slowly, and he hoped that ere long he might be restored to his wonted health and strength. The minutes of former meeting were then read by Mr D. Chrystal, secretary, and approved of by the meeting. Thereafter, the Chairman, in appropriate terms, introduced the lecture of the evening, James Lumsden, Esq., of Arden, who read a very interesting paper on "Bird Life in the Island of Handa," an outlier of the Hebridean Group, situated about four miles off the West Coast of Sutherland. Specimens of guillemots, razor-bills, puffins, greater and lesser blackbacke gull, herring gull, common and Arctic terns, and of the peregrine falcon, all obtained by Mr Lumsden during his visit to Handa, were laid on the table for exhibition. Eggs of the guillemot, puffin and gull were also shown. At the close a vote of thanks was, on the motion of Dr Galbraith, seconded by Mr D. Chrystal, heartily accorded to Mr Lumsden for his paper. A vote of thanks to the Chairman brought the meeting to a close.

THE ISLAND OF HANDA, WITH NOTES ON ITS BIRD LIFE,

BY JAMES LUMSDEN, F.Z.S., F.S.A. (SCOT.),
MEMBER OF THE BRITISH ORNITHOLOGISTS UNION.

To all who are fond of birds, or of seeing fine rock scenery, the Island of Handa is well worth a visit. It is one of the largest breeding places of rock building sea birds on the coast of Scotland. So far as I am aware, no special paper has ever been written upon it, although it has been mentioned, and in some measure described, by various authors. The name Handa is from the Celtic Aonda, "The Island of one colour," or *Aon-taobh, "The Island of one side," either of which would rul y describe the appearance of the island. It is situated on the west coast of Sutherland, about four miles from the village of Scourie; and in order to give a good idea of its appearance I cannot do better than quote Dr J. M'Culloch, who thus describes it, in his "Description of the Western Islands of Scotland" (London, 1819: vol. II. p. 86) —"Of a roundish figure, about a mile and a half in diameter and rising into a sort of inclined table land of about 300 feet in elevation. At the eastern side the declivity of the side is gradual, but the western is an almost unbroken vertical cliff, presenting from its smoothness, and the divisions and colour of its strata, a disagreeable resemblance to a gigantic brick wall. . . . . In a geological view, Handa forms one of those singular detached portions of sandstone in which this coast abounds; being separated by a space of seven miles from the nearest mass of the same rock." The island is now uninhabited for the greater part of the year, but at one time it was let to crofters—its yearly rent in 1793 being £12†, when the population consisted of 10 or 12 families. The oldest widow on the island was called "The Queen of Handa," but whether her royalty was more than in name we cannot say. The soil of Handa is very sandy, and was not found suitable for cropping, especially in the way that crofters in the Highlands treat their land—growing year after year the same crops. About 20 or 30 years ago the whole population left, and all, with the exception of one woman, emigrated to America, where, I doubt not, they will find their land yield them more crop, and their labour better repaid. The island is now under sheep, and there is also a considerable stock of rabbits. The ground is parti-

* Statistical Account of Scotland, 1793: vol. VI., p. 292.
† Statistical Account of Scotland: vol. VI.

cularly suited for the latter, and I will not be surprised to hear that some years hence they become so numerous as to "eat off" the sheep. They were unknown on the island until about 12 or 14 years ago, when one pair were turned out, and so rapid has been the increase that in the season of 1882-3 several hundred pair were trapped. The ruins of the crofters' houses are still to be seen, but the only roofed stone house now on the island, is one occupied by a shepherd, who lives there during the summer months to look after the sheep in the lambing season. In winter the sheep are left; the shepherd paying them only an occasional visit from the mainland. Cattle have also been grazed on the island, but the steepness of the cliffs renders it dangerous for them, and many have been lost by falling over the rocks. Near the shepherd's house, which is on the east side of the island, is an old graveyard. The headstones are rough unhewn slabs set up to mark the graves. This was in years gone by the burying place not only for those who died on the island, but was used by a large portion of the adjacent mainland as well. Before wolves became extinct in this district, it was necessary to bury on islands to protect the bodies from those ravenous beasts. In many places in Scotland we find old burying places on islands, and although many of them are used to this day, there can be little doubt that they had their origin in the same way as the one on Handa.* A trip to the west coast of Sutherland is always enjoyable, for the wild grandeur of the mountain and loch scenery is unsurpassed in any part of Scotland. Fine as it always is, there is perhaps no time of year when it looks better than on a fine day in early June. The bright fresh green of the crofters' patches and the brilliant yellow of the "whin" bushes, are the colours which first attract the eye, while further back, we have the sharp and rugged hills of colder hue, and the deep blue of the sea and sky. The 11th of June, 1883, was a day when everything was to be seen to the best advantage. We left Loch Inver on that day to drive to Scourie, our object being to visit Handa; to see what we could of its bird life, and if possible to take some photographs of the rocks and the birds on their nests. The drive from Loch Inver to Scourie is full of interest. The first part is along the river Inver, from the banks of which, as we passed, we disturbed a pair of Greenshanks.

* Galpin's observations on the Highlands. London: 1808. Vol. II., p. 25 (3d ed.)

Then up Loch Assynt, at the upper end of which we were near the old ruin of Ardvrack Castle, the home of the Osprey in bygone days; then across the ferry at Kyle Sku. As we near Scourie the fine weather threatened to change, and we became sadly aware that the fine bright calm weather, in which for the last week we had been trying to catch fish at Loch Inver, was going to leave us just at the time it would be most welcome for our visit to Handa. Having put up at the most comfortable little inn kept by Mr Turnbull, I set off to find the brothers, Donald and Peter Matheson, who have a life-long experience as craçsmen on Handa. Having arranged with them to be ready to go out to the island the next morning, if the weather would permit, I went off to bed in rather a doubtful state of mind, for the fine weather was gone. The glass was going down, the rain had begun to fall, and the wind to rise. The next morning the weather was as bad as it could be—a thick, wetting mist driving before a strong breeze of wind, just the worst possible weather for seeing the cliffs or taking photographs. I had given up all hope of getting to Handa that day, when about ten o'clock the wind fell a little, and the weather looked altogether more hopeful. The Mathiesons, who were accompanied by their cousin, Murdoch Mathieson, had their boat ready, and as they said they thought the weather would improve, we set sail for the island. Murdoch entertained me on the way with a description of a visit he had just paid to London, he having been one of the representative fishermen who went up from Sutherland to the Fisheries Exhibition. He is a most intelligent man and had thoroughly enjoyed his trip to the south, and spoke of the Zoological Gardens as one of the most interesting sights he had seen in London. Before reaching the island the wind almost quite died away, and the men had to take to their oars, but there was still a considerable swell caused by the high wind during night. As we got near the island we saw Cormorants, Shags, and Gulls on the water, or flying about. A few Cormorants were sitting on the out-lying rocks, and a few Terns (either common or arctic) were flying overhead. Quite near the landing place we saw a bird I could not have identified myself with certainty, but which Donald Mathieson called the "Dirty Allan," and described its habits, saying that it followed the Gulls and Terns and made them "spew" the fish they had eaten. This graphic description left the identity of the

bird less doubtful, and confirmed me in my belief that it was a Richardson Skua. We landed quite near the shepherd's cottage, which is on the side nearest the mainland, and that furthest from the cliffs. As we walked across the island I noticed several Wheatears, but as we were more interested in the larger birds we did not delay to look for their nests. We now reached the south end of the cliffs, and the sight was most interesting, although we had only a very imperfect view of the birds, owing to the mist, which increased as the wind fell. At this part there was a Peregrine's nest, which Peter Mathieson found to contain one young bird and an addled egg. He took away the bird alive, having promised to get one for a gentleman who wished one to tame. We then walked along the top of the cliffs towards the north. Nearly all the available shelves were filled with birds—Guillemots, Razor-bills, and Puffins. I tried to make out the respective number of Common and Bridled Guillemots on several of the shelves, but the weather was so thick and misty that it was not easy to distinguish them. On one small ledge, however, which contained 13 birds, I clearly made out 10 common and 3 bridled birds. Passing along the top of the cliffs, we came to one of the most interesting spots on the island. It is a deep hole or well about 50 yards by 30, as near as I could guess without measuring exactly. It goes right down to the sea, with which it is connected by two Gothic shaped arches or tunnels. On the sides of this hole there are now no nests, but Donald Matheson informed me that he had been told by a woman who had at one time lived on the island, that in her young days—which must have been 50 years ago at least—Shags and Gulls used to breed on the sides of this place in considerable numbers. Further on we came to the Stack. The birds are more numerous here than at any other part of the island. At one time they were even more plentiful than they are now. Until about 8 or 10 years ago no one had ever succeeded in climbing the precipitous sides of the Stack, and the birds evidently believed that they were safe there from the hand of man. About that time, however, a party of fishermen from Stornoway, by some means or other, managed to get a rope over the rock and so get to the top. They killed and took away several hundred birds. Those birds are considered quite a delicacy by the fisherman, although I cannot agree with them on this point! Since this wholesale

robbery the Stack has not been nearly so much frequented as before, at least, so we were told, but it was, at the time of our visit, covered with Guillemots, Razor-bills, Puffins, and Gulls. After spending some time in securing a few specimens of eggs which were taken from the ledges by Peter Matheson, we walked across the island to the place where we had left the boat. On our way we disturbed a White-tailed Eagle, which rose from the ground and was soon lost sight of in the mist. The next day was bright and clear, and although there was too much wind and swell to allow us to sail round the island as we had planned, and were most anxious to do, we were able again to go out, landing at the same place as on the former day. On this occasion we were accompanied by the ladies of our party, and the short time we had on the island was spent in walking round the cliffs, and in taking a few photographs. We could not stay too long, as the wind was rising, and we feared if we did not leave in time we might share the same fate as the marriage party mentioned by Lord Tigumouth in his "Sketches of the Coasts and Islands of Scotland. London, 1836." The daughter of the shepherd—who at that time lived all winter on the island—was being married, and a party of friends were invited out to the ceremony. A piper and a large supply of whisky, as is usual on such occasions, were not forgotten. During the entertainment the wind rose, and for five days the whole party were stormstayed on the island, the only accommodation being the cottage and its outhouses. "Whilst the whisky lasted," says Lord Tigumouth, "they submitted with tolerable resignation to their fate, but when this resource failed, they began to contemplate, with unmitigated horror, the prospect of exhausted provisions, and received no comfort from the unavailing exertions of the poor piper." We, however, were more fortunate, and got back to Scourie in good time, although the sea was quite rough enough for some of us who are not very good sailors. As we were obliged to leave Scourie the next day, we were unable to sail round Handa as we had wished, but I can believe, from what I saw, that the rocks, when viewed from the sea, must be even more imposing than when seen from above, and a better view must be had of the many thousands of Guillemots, Razorbills, and Puffins which crowd their ledges. In the following list I have enumerated all the species observed during my visits to Handa :—

White-tailed Eagle—Haliætus albicilla (Linn.)—One seen by us on 12th June, 1883; but was not nesting on Handa. This species, although a well-known bird in Sutherlandshire, is not now as common as the Golden Eagle, which is still fairly numerous in the county.

Peregrine—Falco peregrinus (Gmel.)—One pair nest on Handa nearly every season. On 12th of June we took a young bird almost ready to fly. On the coast of Argyleshire, where I have often been at the taking of Peregrines, the young are ready to fly ten days or a week sooner than the nest we saw on Handa. I cannot say if it is an acknowledged fact that the further north one goes, the later are the birds found in nesting. This is a question that can only be settled by a careful comparison of dates not for one season only, but for many seasons, and from various localities.

Wheatears — Saxicola œnanthe (Linn.) — Several pairs seen on the island, where they no doubt nested; but as our time was occupied with the sea birds we did not look for the nests. This is a well-known summer visitant throughout Sutherlandshire.

Tern—Sterna (?).—Several seen flying round the island. They were either common or arctic, but I could not tell which. So far as I know neither of those species breed on Handa.

Great Black-backed Gull—Larus Marinus Linn.—Saw several birds of this species sitting on stones and out-lying rocks, as we sailed out to Handa, but did not see them breeding on any part of the island. Mr Harvie-Brown says that they used to breed on the top of the "Stack;" but so far as we noticed there were no nests there at the time of our visit.

Lesser Black-backed Gull. Larus fuscus Linn.—Several seen flying about on our way out to the island. I did not identify this bird as a breeding species, but Mr John Colquhon in his account of the Wilds of Sutherland in "Sporting Days," includes it as one of the species he found nesting on the island.

Herring Gull. Larus argentatus (Gmel.).—A good many seen on the island. That they breed on the cliffs I am almost certain, although Mr Selby in his paper* "On the Quadrupeds and Birds inhabiting the County of Sutherland," says he observed no breeding station of herring gulls in the county.

Kittiwake. Rissa tridactyla (Linn.).—Breeds in considerable numbers on the cliffs. They breed usually much lower down on the rocks than the razorbills, or guillemots.

Richardson's Skua. Stercorarius crepidatus (Banks.).—Although there is just the possibility of a doubt that the bird we saw on our way out to the island was *not* a Richardson Skua, I include it here, with this reservation. I really have no doubt on the subject myself, but as it is not a well-known species in the neighbour-

* Edinburgh New Phis. Journal, 1836.

hood of Handa, I feel that I cannot be too careful. Nothing requires such care as the recording of species correctly, and inaccuracy is the worst fault that a naturalist—whatever his branch—can have. Better far not to record a species from a district, than to record one not to be found there.

Razorbill. Alca torda Linn.—Very plentiful, although not so numerous as the guillemots. The eggs of the razorbills are usually on the highest ledges, the guillemots occupying those lower down.

Guillemot. Lomvia troile (Linn.).—This is by far the most numerous species on Handa. Any estimate of the numbers that breed on the ledges would be quite impossible. But according to Mr Harvie Brown, they far surpass in numbers those found on Ailsa Craig, the Bass, or Hoy Head. (Proceedings Nat. Hist. Society of Glasgow, vol. II.) The ringed variety which was at one time considered to be a distinct species is also met with. Mr Harvie Brown, who has paid much attention to the subject, considers that ringed birds are to be found in the proportion of one or two to every ten or twelve of the others. Matheson told me that he has always found the eggs of the ringed birds to be white with markings of a light brown. This does not agree with Mr Harvie Brown's experience of the species in other places.

Note.—Black Guillemot. Uria grylle (Linn) is said to have at one time bred on Handa. We did not see any at the time of our visit, and the Mathesons told Mr Harvie Brown some years ago that "the rats had managed to dislodge them."

Puffin—Fratercula arctica (Linn.)—Very numerous round the top of the stack, and indeed over all the cliffs. These impudent little birds are not easily disturbed, and will let one go quite near them as they sit on the top of the rock.

Cormorant—Phalacrocorax carbo (Linn.)—A good many seen, but we saw none breeding. We were told, however, that they breed in considerable numbers on the Badcall Islands, a few miles distant. Mr Harvie-Brown, in his paper on the Birds of Sutherland, says that a few breed on the highest part of the cliffs of Handa, or at least did so at the time when his paper was published, which is about ten years' ago.

Shag—Phalacrocorax graculus (Linn.)—Several seen on the rocks as we neared the island. They breed, but we did not see their nests, as we were unable to sail round the island owing to the heavy swell. This species nests in the caves on the Western side of the island. At one time they were known to nest in the large well before mentioned.

This ends the list of birds observed on Handa, for although rich in bird life, the number of species found on the island is comparatively few.

Mr J. A. Harvie-Brown of Dunipace, F.R.S.E., F.Z.S., delivered to a large meeting of the Society, in the Smith Institute, on the evening of Tuesday, 24th March, a lecture on "The Migration of Birds." On the motion of Mr A. F. Hutchison, M.A., seconded by the Rev. Wm. F. Goldie, M.A., who presided, the thanks of the meeting were conveyed to Mr Brown for what is regarded as the most important paper ever read before the Society.

THE MIGRATION OF BIRDS.

By J. A. Harvie-Brown of Dunipace, F.R.S.E., F.Z.E.

Some years ago, in the infancy of our statistics, I gave this Society some remarks upon this same subject on the 13th December, 1881. There I spoke somewhat of the theoretical part of the subject, as advocated by Herr Weissman in the *Contemporary Review*. I then went on to speak of the ascertained facts regarding Migration, based upon one and part of another year's observations and the statistics of our Committee.

I am glad to be able to say, that since then our Committee has found little to alter, a little to modify, and nothing actually to reverse, though some data of interest to add to the results I then spoke of, while some phenomena still require further investigation.

In giving the following notes upon the subject of Migration, it may be necessary for me briefly to refer to the manner in which the inquiry was instituted.

For some years previous to 1879, my friend and colleague, Mr John Cordeaux, and also Mr J. H. Gurney, jun., and Mr Booth, had paid considerable attention to the bird-facts gleaned from Lighthouses. I myself had for some time also collected annual notes on mammals and birds from many inland localities, and had arranged and condensed these in the Proceedings of the Natural History Society of Glasgow. The first of these Reports on Scottish Ornithology bears date of 1880, and comprises a Journal of the severe winter of 1879-80, which winter must be fresh in the memory of all present; and also contains a Report on the Migration of Birds in the year 1878. Since then I have issued two more annual Reports for Land Stations in the Proceedings of the same Society.

At the same time a proposal was made by Mr Cordeaux and myself to join our work, and include in our inquiry the whole East and West Coasts of

Britain. This we did, issuing approved circular schedules and letters of instruction to all lighthouse keepers of the Scotch and English coasts, having obtained the permission of the Commissioners of Northern Lights, and the Elder Brethren of the Trinity House. The first result of this was a "Report on the Migration of Birds in the Autum of 1879," published by the courtesy of the Editor of *The Zoologist* in a double number for May, 1880, and occupy- pp. 161 to 204 of the Volume for that year.

In 1881, we again issued a Second Report, and read an Abstract of the same at the meeting of the British Association at Swansea, in consequence of which a committee for further investigations was appointed by the British Association, in terms of the following letter :—

"British Association for the Advancement of Science,"
22, Albemarle Street, London, W.

Sir,—I am directed by the General Committee of the British Association for the Advancement of Science to transmit to you the following copy of a Resolution, which was adopted by the Committee at the last meeting to request your attention to it, and to the annexed extract from the Rules of the British Association :—

"That Mr J. Cordeaux, Mr J. A. Harvie-Brown, Mr P. M Kermode, Prof. Newton, Mr R. M. Barrington, Mr A. G. More, Mr J. Hardy, be appointed a Committee for the purpose of obtaining (with the consent of the Master and Elder Brethren of the Trinity House and of the Commissioners of Northern Lights) observations on the Migration of Birds at Light Houses and Light Ships, and of reporting upon the same at the meeting of 1881 : That Mr Cordeaux be the Secretary, and that the sum of £15 be placed at their disposal for the purpose."

(Signed) T. G. BONNEY, Secy.

Inclusive of our first report we have issued in all five reports up to date, and during that time, have had the pleasure of having our grant increased annually, and of seeing our investigations taken up and followed out energetically in America, and at the First Ornithological Congress at Vienna, so that now, a net-work of similar observatories is stretched over two Continents ; and much that was vague and uncertain before, regarding the phenomena of migration and distribution, is being rapidly cleared up. Our committee are not permitted to start or promulgate theories, but simply to collect facts, and to arrange them systematically. Nothing would be easier than to theorise, but this may not be done, at least, in our reports to the British Association, though we are not forbidden to do so elsewhere. I hold, with undoubtedly many others, that a certain amount of theory, after a certain amount of accumulation of data, is not only permissible, but advisable, and is calculated to further

the interests of any similar inquiry. Theory, in moderation, directs and often assists the clear perception of a large accumulation of statistics, though on the other hand it just as often distorts and leads astray, if exercised prematurely.

I propose now simply to state the facts of migration in each of the years of our inquiry—viz., 1879 to 1884 inclusive, and to give a summary of the conclusions arrived at, restricting my remarks to the Scottish coasts of which I have charge.

In 1879, unusual scarcity of birds on both Scottish coasts was reported. Scarcer at Sumburgh Head than during the past 21 years. Reporters almost always credit the strong prevailing N.W. winds, with "crushing down" towards the southward, the rays of the fan of migration, forming in fact a compressed "closed fan of migration." Even at our principal stations, such as Isle of May, remarkable scarcity is recorded; and from the inferior stations, utter absence of birds.

In 1879, the greatest numerical migrants are Thrush, Blackbird, Lark, Wheatear, Swallow. This sequence varies considerably with other seasons, finches, in most years, having a decided prominence.

On the English Coast a large migration of Hooded Crows is noticed, but there is an utter absence of all records upon our East Scottish Coasts of Corvidae, owing, of course, to the prevalence of N.W. winds, and consequent "closed fan." Rooks, also, which were fairly abundant on the East English Coast, are only reported from one station, and that our northernmost viz.—North Unst in Shetland

In 1879, general scarcity is also recorded on the West Coast, and at stations such as Monach Island, Island Glass, which are commanding positions, scarcely any returns are made, and the same at Skerryvore and Dhuheartach. A note by the Light-keeper at Skerryvore gives the information that, in 1877, no less than 600 birds were killed at the light during October, and, at least, 200 more fell into the sea, chiefly Common Thrushs, Blackbirds, Snipes, Larks, &c. In that year they came every night between the 1st and the 6th, and the number was estimated at about 1000. No birds were seen during the daytime in that season.

The normal direction of wind on the coast was N.W. or N.N.W. to S.W. and S.S.W.

In 1880 a great rush of Spring Migrants past Bell Rock took place between March 2d and 11th. In 1880 a considerable increase of migrants over 1879,

but the increase appeared more on the west coast, than on the east coast. Many birds are reported from mid-Atlantic, the records agreeing in dates with those of our land stations. As we have seen in 1879 winds were N.W., causing a "closed fan," the rays of which were deflected to the east coast of England. This year, 1880, winds prevailed E. to N.E., not compressing the fan so very much, but birds passing at higher altitudes over North Britain, reaching further north on west coast, and many borne away resistlessly over the ocean. Not so many throbs or rushes patent, the "fan" being more *spread* out, not closed. The mortality at sea consequently greater. 1880 is a good year for rarities, and we find, amongst others, records of Esquimaux Curlew, Orange-legged Hobby, Turtle Dove, Great Snipe, Great Grey Shrikes (abundant in Heligoland).

In 1881 a scarcity of migrants, especially north of Firths of Forth and Clyde. The returns from Firth of Forth, Firth of Clyde, and southward of the latter, heaviest. N.W. winds resembling those of 1879, sufficiently account for the similarity of these years, but birds were rather more abundant in 1881 than in 1879 (see concluding remarks in our report for 1880, p. 94, and report for 1881, p. 54). A high temperature and open winter made rushes less defined, but still marked and distinct, these throbs or rushes being more dependent really upon directions of wind, than upon local severity of weather.

This year a "closed fan" of migration. Winds, as in 1879, N.W.

Note.—The constantly recurring records of the captures of certain migratory species at the same localities—*i.e.*, along the same lines or routes—instance the regularity with which these routes are maintained; and an indication also of the general breeding range of some far more Arctic species, may very possibly be found in the direction of their Spring flights, leaving our east coasts. Thus the Grey Plover appears in full breeding plumage at and south of Spurn Point, in Yorkshire, but is *extremely rare* in Spring anywhere on the coasts north of that point. The Grey Plover is now known to breed east of the Great Petchora River in N.E. Russia.

In 1882 easterly gales prevailed all the autumnal migratory season, as may well be remembered, at Eyemouth, in Berwickshire, in the awful gale of 14th October.

Another rare occurrence was that of Saxicola deserti *(The Desert Wheatear)*, at Alloa, whose natural habitat, is S.E. of Europe, North Africa, Persia, and India, whose identity was determined by Mr J. J. Dalgleish and myself, and placed for the first time on record on our British list.

The effects of these extensive and long-continued east gales, was to spread out the fan of migration to an unprecedented extent in the annals of the past few years, and even on the extreme S.E. coast of England, migrants continued to fly from S.E. to N.W., all through the migratory season. The "fan" was spread out both to the *northward* and to the *southward*, beyond normal limits. The further effects of this abnormal season point to a further aphorism being within fair distance of establishment, viz.:—

Land birds in normal seasons occupy nesting sites year after year, but abnormal seasons may often cause the sites, so long used, to be abandoned. And it still remains for the student of migration and distribution, clearly to tabulate some day the exact effects of abnormal migration upon what may become definite distribution of the future.

In 1882, an early winter in Scandinavia still further augmented the rush over of migrants. The autumn migration of any one year must exert a very great influence in many ways upon the next spring migration, and it is thus often that extension of range of breeding species occurs, and spread *northward*, as we know has been the case in Scotland; and this apart from local causes.

The great event of migration in 1882 was the marvellous rush of Gold Crested Wrens, from Faroe to the English Channel, the heaviest returns coming, as usual, from Isle of May, Bell Rock, and Pentland Skerries, the great east gales occurring just at the usual time of migration, viz., between 8th and 25th October. But curiously, the usual blank expanse of coast line occurs all the way from Dunnet Head to Bell Rock, which is indeed most singular. The movements of the tiny Golden Crested Wrens may be looked upon by students of migration as safe indicators and exponents of the general laws of migration. At the sheltered station of Inchkeith, scarcely any returns are made. It is sheltered from the S.E. Any migration which occurs here is usually observed with a W. or S.W. wind, and may be said to be due almost entirely to local movements, or to the extension of lines of flight-flocks of birds passing S.E.

across the Forth, which lines at an earlier period reached our shores from the Continent further to the north. With all this vast rush on the east coast, an unusual scarcity of birds was recorded on the west coast, easily accounted for, under our set of aphorisms, which I shall presently give you.

In 1883 migration pronounced, compressed, of most species. Rush of October 28th and 30th, to November 4th and 14th, the principal feature of 1883 migration. Vast numbers seen at Lightships off the east English coast, but less visible on the coast, birds passing inland. Winds W. and N.W. (see here our report for 1883, p. 78, where the effects of the winds—N.E. and E. in 1882, and N.W. and W. in 1883, are fully spoken of and compared.)

The arrivals on the Scottish coast, dated about 24 hours later than upon the English coast, as is evident from our schedules.

Amongst rarities, was a Blue-Throated Warbler at Isle of May.

In connection with the 1884 report I may state that an excellent paper was read at the half-yearly meeting of the Scottish Meteorological Society (on March 23rd 1885) by Mr Cunninghame upon "Velocity and Directions of Winds and Wind Strata," (I don't know if I give the title correctly), and a chart showing the velocity, force, and duration in time of the winds in each section of three months of the year, during 1884 as observed on the tower at Dundee. From this I have noted the following :—

In 1884 generally S.W. wind and W. winds exceeded all others in duration of time and velocity.

In March, April, and May, 1884, the greatest velocity were from points S. of E. and S. of W. but the prevailing direction was from W.

In June, July and August. The greatest velocities were from S. and S.W., but the prevailing direction was from E.

In Sept., Oct. and November, 1884, greatest velocities were W. and prevailing direction from the W. *not* from the S.W. Easterly winds very rare and very light.

In December, (1884) January and February (1885) the greatest velocities were from W., but none very strong, and very little wind from other directions, most of which latter were S., and S.E.

In 1884. In this report now in preparation we publish a map of Britain showing all the stations in red. I show you a preliminary proof.

Some of the principal features of the 1884 migration—our sixth report—are the amazing flocks of

Gulls along our east coast following the vast shoals of garvies or sprats including two specimens of The Little Gulls (Larus minutus) the first I am aware of as having secured within the estuary of The Forth, and the 5th and 6th recorded in Scotland.

In Spring easterly winds prevailed along its whole coast line and throughout the year, and in Autumn up to about the 20th September, when they changed to westerly and northerly, at once checking visible migration on to the E. coast, though it continued overhead as is evident from the dates of rushes on the W. coast, and the extension towards the north, of the rays of the fan, north of Clyde.

The Eclipse of the moon on 4th October was accompanied by great rushes of gold crests on both coasts, but only visible during time of greatest darkness—9.45 p.m., and 11 o'clock—I myself witnessed this at the Isle of May. Wind was light, W., cloudy after eclipse, and about period of totality.*

The Fork-tailed Petrel has occurred at Girdleness and Isle of May this season. The unusually early arrival of the Swallow and late departure (see Bell Rock, 13th—15th March, and report 1884, Land Note at Girvan 6th November, 1884.) The Black Redstart occurred at Isle of May in Autumn and at Pentland Skerries—adult male—in Spring. A late

* After dinner we went out to the Pilot House to await the eclipse of the moon on the 4th Oct., 1884. At 8.10 p.m. it began in a clear sky, and we watched it, throughout all the phases till total eclipse at 9.10 p.m. (Greenwich time). Though the night was otherwise sufficiently clear to have prevented any migration being visible, within the influence of the rays of the lantern light, the eclipse of the moon on this 4th Oct., 1884, afforded the opportunity and, between the hours of 9.15 p.m. and 11 p.m., during totality, and the darkest time, a decided 'rush' of Golden Crested Wrens (Phylloscopus cristatus) took place. The first Gold-Crest was taken on the glass by Mr Anderson—assistant on watch—and brought down to the Agnews' kitchen at 9.45 p.m. Anderson began his watch at 8. Eclipse began at 8.10. Darkest time or totality, 9.15 to 11 p.m. The last Gold-Crest caught was at 11 p.m. We caught in all 12 Gold-Crests during that time, and the Robin, the latter at 10.15 p.m. Slight haze, moon partly obscured by clouds at the time of totality; wind light west. After 11 p.m. the clouds became thinner, and the moon re-asserted her sway; and after waiting till 12 midnight, just to say good night to Mr Agnew, when he came up for his watch, we went down stairs and turned in, much pleased with even this small *demonstration* of migrants. No more were seen after this at the lantern. Standing close against the inner balcony wall in the shadow of its cope, which projects from beneath the lantern glass, and looking outward and eastward over the Pilot House, we could see the little fluttering forms of the tiny Gold-Crests, more like butterflies than birds appear within the influence of the rays, and usually opposite the centre of the principal lens, or nearly so. To-night, it

Spring Migration is also apparent, for which it seems difficult to account. It took place in the second week of May, and was noticed also on land, and was composed principally of warblers and insect feeding birds.

The migration of 1884 resembles somewhat that of 1882, but differs from it in this wise, that during the time of usual migration the fan was crushed down to the English east coast, leaving the east Scottish coast somewhat deserted up to a later date. But then S.E. winds again coming after a long continuance of N. and W. winds, heavy rushes were noticeable. The west coast affords much heavier returns from Rhinns of Islay, than the east coast stations. Many rarities occurred on the east English coasts, but we have little to record from the Scottish coasts, except those already mentioned. The heaviest rushes are recorded in the middle of November, but considerable rushes are also given in end of October at the west coast stations, while continuous evidence was afforded at Isle of May, mostly by day, by small movements overhead.

Thrushes and Finches as usual bulk largest, but whereas in some years these travel much together, this year, while many still travelled simultaneously in Spring, yet the great rush of Thrushes in autumn

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was only singly or at most in pairs that they appeared. One little thing, whilst my friend P—— was scrambling round the iron gangway outside the glass, was seen to alight upon his coat. Soon after they became visible in the rays of light, they settled on the projecting framework of the glass, fluttered like moths round a candle, and clung there till captured by hand. The first brought down by Mr Anderson was let away by Mrs P—my friend's wife—with unanimous approval. She took it out to the S.W. side of the light house on the lawn, opened her hand and gave it freedom. Still dazed and doubtful—dazed by the recent glare and doubtful by the present darkness—it clung with its little claws tight round her little finger; then as a little more re-assurance came to it, it hopped from the tip of one finger on to the next, and preened its feathers, and shook its plumage vigorously, but uttered no sound. Finally it flew off, or fluttered off, rising upwards. We fear it again found the rays, and was again lured to the glass. The experience gained by us, this first night of our personal inspection is—If there had been no eclipse of the moon—full moon—no migration would have come within the range of our vision, nor have descended to within the influence of the rays of light, concentrating opposite the principal lens. It was only during the period of totality and of eclipse and cloud combined, that their presence was observed. Before that and after that none were seen. And whilst the eclipse was at or near totality at 9.15, it was not till 9 45 that the first bird was seen, at which time the greatest amount of cloud was over the sky, which latter continued till close upon 11 o'clock, when the last was caught.—*M.S. Journal*, J.A.H.B. 1884.

did not take place till the rush of Finches was over, by nearly a month.

The movements of Solan Geese are still further elucidated, and we have made some comparisons regarding the migrations of the Woodcock during the past 6 years, which may prove interesting (see Report), and the movement of Gulls have had special treatment, and been compared with a vast invasion of Arctic Gulls from similar causes in 1872-73 (vide. Proc. Glasgow Natural History Society, Jan. 7, 1873). A curious item is that the estuary of the Tay was quite deserted by sprats (clupea sprattus) this winter, and consequently by Gulls also. Regarding the causes of the superabundance of fish and bird food, "Nature" of Feb. 12th, 1885, has come valuable remarks upon the temperatures and abnormal state of the Spitzbergen seas, as reported by the Norwegian explorations. 1884 was a very remarkable ice-year, the "west side of Spitzbergen having been blocked with a belt of land ice the whole summer through, while the east side, which is nearly always blocked with ice, was more open than it had been for many years. These conditions, there seems little doubt, depend on the prevailing directions of the wind." By the returns sent by Captain Gray, who was in the Spitzbergen seas, it will be seen that "whale food" was extremely abundant, probably driven south-westward by low temperature of the water close to Spitzbergen.

I await returns through the kindness of Mr Alex. Buchan of directions of winds in the Arctic.

GENERAL REMARKS.

The following is an attempt to summarize some of the results of the past 6 years of our migration committee's labours, as regards the conclusions arrived at from the study of the Scottish coast alone. As member of committee having charge of the Scottish coasts, I consider it more in accordance with the work set before us, to confine my remarks and summary to that portion, leaving to the other members of the committee the analyses of their own coast returns.

The result of six years experience of our subject and collection of data, enables me to state what are now recognised facts.

We know and may affirm as aphorisms, or undoubted facts:—That land birds travel to our shores from east to west or from south of east to north of west, and land birds prefer to travel with a beam wind or even with a head wind if not too strong.

Land birds do not voluntarily travel with a following wind, because it destroys their steering power and blows their feathers the wrong way. Yet, are they often borne away or caught unawares in storms and gales from these unfavourable directions.

Land birds, when thus caught up and borne away, are often drowned hundreds and even over one thousand miles out at sea in the Atlantic.

Land birds if persecuted by a following wind during their flight across a wide expanse of sea, on reaching shore, drop exhausted even among the tangle on the beach for rest, or in the first shelter.

Land birds, which as known, migrate over the sea with a beam wind, if the latter does not rise in strength beyond their powers to combat, are often seen to arrive from seaward and pass on overland and inland, following usually a north of west course.

Land birds are impelled to migrate by forces of nature ; temperature, food supply, possibly light, at their northern and southern limits. The details of this require yet careful working out though the principle must be acknowledged.

Land birds, in clear weather, travel at great altitudes as has been ascertained by an American Astronomer. Why? We only suggest—because of the rarer atmosphere aiding progression ; the commanding altitude, and their viewing their road-ways as on a map beneath them, and more favourable currents of wind aiding their flight.

Land birds, in haze or fog, descend to lower levels, often flying low over sea and land. Why? because they cannot shape their course through endless bewilderment of cloud above, and with all their roadways blotted out beneath. Fog, also, in an otherwise blotted out expanse of haze, means a haven of rest, of food, *land* in the midst of ocean.

Land birds pass on migration at all hours of the night and day ; but some species are evidently more partial to day flights than to night ones. For instance the Swallow is comparatively rarely seen on the lantern face at night, whilst Larks, especially, and Thrushes, the tiny Gold Crest, and others are infallibly lured to the lights, like moths to a candle.

Land birds appear to follow recognised highways whether at high altitudes or low. Well-known passes are familiar to almost all accredited observers in many lands. There are passes across the high Alps, there are even favourite valleys in our Scottish Lowlands, where year after year the annual flow takes place, such as the Vale of Menteith, between Stirling and Loch Lomond. How far we can at

present decide as regards the gradual influences of migratory movements thus brought to bear upon the distribution of species, is at present slightly beyond the limits of our official ken. Yet the principle must be acknowledged and accepted that distribution does depend on phenomena of migration—or migrational influences—and that migration is also reacted upon by distributional influences. These two are part and parcel of the same natural causes and effects.

Land Birds coming to our shores from E. to W. if the wind is beam or favourable, pass on across Scotland to the west coast. But thereafter their course is altered, so far as lies in their power under circumstances, and the line of flight becomes N.W. to S.E. (passing for instance the Outer Hebridies in a south-easterly direction towards Scotland or the Irish Channel). Long continuing easterly gales at the time of migration may, and often do, force thousands of birds out over the wide Atlantic, to perish in the sea, or settle on the rigging of the ships for rest.

Land Birds which, as we have seen, travel best with a beam wind say in Autumn, and so reach our coast, and so pass inland at once, without resting, to the west coast; if they preserve a course from E. to W., and usually rather to North of W., it is reasonable—and besides has been proved—that in a normal west wind, birds reach further north on the west coast, than in seasons when wind is easterly. The best example of this, in our experience, is the vast influx of Golden Crested Wrens in 1882, with east winds, which covered the whole east coast line, from Faroe to the English Channel, and *yet* reached no farther north on the *west* coast than Rhinns of Islay, massing only again south of the Firth of Clyde. Compared with 1883, a much smaller movement was observed on the east coast (owing to the reasons already explained, the more favourable westerly winds prevailing), *but* a much more northerly extension on the west coast, records coming from as far north as Dhuheartach and Lismore. In the east winds they sank exhausted on the first land they touched, and then recovering, followed the land-communications to the south, leaving out the west coast. In the west winds, less fatigued, they *pressed on*, and of course reached further north and west.

In this connection it is also curious to observe that if any one autumn, owing to prevailing winds, birds reach further west than usual, that the return-

movement in spring following, leaves very generally traces behind of the "repetition of the lines," if I may so term it.* The further west birds are seen on autumn migration, the greater are the chances that an abnormal "westering" of the same species takes place the following spring. To explain this, requires more data, yet I may express my firm conviction that this is dependent upon comparative distribution at the winter habitats. If blown further west in autumn a species may, and probably does, winter unusually far west, and it is quite likely, may probably return by a more westerly route, and thus occur at localities further west than before recorded, and thus again influence future distribution in the nesting season which follows.

Note.—It has often been the case that the occurrence of a rare European—*i.e.*, Eastern form—recorded from some far-northern locality in Scotland, has been ridiculed and disbelieved in by scientific naturalists resident in London, who had formed an idea of distribution of species on the Continent in the breeding season, without considering these migrational influences brought to bear in many seasons such as I have endeavoured to explain; and very often nothing but a personal inspection of the specimens so recorded satisfies them. But, I think, if our contention that greater westering of birds in autumn, owing to abnormal excess of easterly winds or gales, takes place, and produces a consequent greater westering of their returning spring route, new localities and circumstances affect the species so migrating and often induce them to remain and occupy these new sites, especially if their return be delayed and be abnormally late, and this, if often enough repeated (i.e., if the same circumstances recur often enough in autumn), consequent extension of distribution in the breeding season is sure to follow. How else can we account for the great increase for instance of Woodcock breeding in Scotland within the last 20 years, and the undoubted occurrence of many other species increasing annually in districts north of Tweed. I instance the latest, and perhaps one of the most remarkable, viz., that of the Stock Dove, which has become, within the last very few years, a far from uncommon breeding species in this county. It is vain for southern naturalists to say, "Oh! want of previous observation, provincial

* We have had a number of instances of this, but we do not put this forward as infallible, as so much must depend upon weather and prevailing winds, and strength of winds at the time.

ornithological ignorance, absence of suitable observers! Please send the bird up to London." Verily, I don't think a more provincial place exists than London. Errors do occur amongst the best observers in Scotland. I myself have not a few to confess to, but I can on the other hand instance many increases of species in Scotland beyond dispute of late years.

I hold that our statistics distinctly go far towards proving that distribution of species in the breeding season is largely dependant upon fluctuations of migrational waves. I could say much more as regards the wonderful constancy of occurrences of migratory flocks along certain lines of country, year after year, and occurrences of certain rarities at favourite sites, but refrain for the present, feeling assured that the more extended are our statistics, the more certainly will the two phenomena of distribution—or rather extension of range—and migration be found to be dependant upon, and resulting from one another.

Water Birds on the other hand fly on migration north and south. Being of stronger pinions and less dependant on land for resting or feeding, they travel more direct; also, being less dependant on temperatures of the air for food supply, they act more independently of them, resting on the water *en route*, and from the closeness of their plumage, rejoicing in an element, which to a poor weather-tossed land-bird, would be certain death. They hesitate not to fly down and along the longer parallels of longitude, covering hundreds of miles a day, whereas the land-birds, strong though their pinions and endurance of fatigue may be, choose the more natural parallels of latitude, which *cross the largest areas of land.**

Whatever it is that influences birds—whether land birds or water birds—to migrate, these must be natural causes, as part of one great and universal plan, and these, I think, may simply be looked for in broad terms, as *food supply*, acted upon by *temperature*, and these combined, and possibly by light. Life needs light and warmth. Entromostraca and delecate organisms which swarm in summer in the warm shallow Arctic seas and rivers along the north coasts of Europe, and afford supplies, unbounded, for fish and bird alike, retire into deeper water, perhaps migrate to the warmer currents of the further arms of the Gulf Stream; and then the birds remove by necessity to warmer climes, and follow these entro-

* In ocean returns of 1884 we have records of flocks of the semi-aquatic Grey Phalarope seen flying and settling on the water in the latitude of Cape Verde.

mostraca in their migration, which are undertaken from similar causes.*

And this last reminds me that I ought to have included another aphorism, viz :—

Land Birds return in Spring, following the same routes as those followed in Autumn. In Autumn whilst a westerly wind favors them, in Spring, easterly winds constitute the normal, and most favourable winds for return passage. Thus while birds strike the coast, say at the Isle of May, and pass down (South) along the coast of Ayr in the west; in autumn, they return up (North) along the coast of Ayr in Spring, and *leave* our shores at Isle of May or Bell Rock. (Certain exceptions are afforded to this rule, and explained amongst *Charidriadae and Waders*, &c., which, however, are hardly land birds, but are what are termed "littoral" species.

In our report to B. A. for 1884, we have already spoken of the migration of Woodcocks, whilst analysing the past six years' results, as having some special points of interest. We need not refer to it further in this place. (See Report in Press.)†

We have also spoken of the positions of lights, degrees of brilliancy &c., and pointed out the deductions arrived at. These deductions we consider pretty fully borne out during the past six years inquiries.

The Spring migration from our coasts—we have now, we consider, proved—follows the same lines, reversing the direction of flight, as those in autumn. The reasons why autumn migration is almost invariably in greater mass than Spring migration is explained thus :—*First*—much vaster numbers of birds. *Second*—Less dispersed, and more decided pulsations. *Third*—Prevalence of fog and haze over our British seas and coasts in autumn. *Fourth*—

* In our detailed reports for 1884, will be found some suggestive facts and data, in this connection, of the unusual visitation of Gulls, following the sprats or "garvies" down along our east coast of Scotland; which "garvies," had apparently followed a dense mass of migratory entromostaca or "whale food," which, also, in their natural course, had retreated to the warmer waters of the Gulf Stream, owing to prevalence of east winds around Spitzbergen, blocking up the west coast of that land, and lowering the temperature of the water. I mention this with diffidence, as I am still engaged in inquiries, in which my friend Mr A. Buchan is kindly assisting me: and concerning which we hope to have much more distinct data before other 12 months are past, thanks to Mr Buchanan and members of the Marine Station at Granton.

† Messrs West, Newman, & Co., Publishers, 44, Hatton Garden, London, E.C.

Less rapid passage southwards, and more feeding *en route*. All these reasons cause autumn migration to be more brought under our notice than Spring movements. The knot *(Tringa canutus)* which nests in high arctic lands travels furthest south in Autumn. The Autumn birds, however, invading every creek and inlet of our east coast of Scotland* but the Spring returning birds, apparently almost always leaving our shores at points considerably further south, viz. : at Spurn Point, as do several other arctic breeding species such as the Godwit, Sanderling, Grey Plover, &c., which are very rarely indeed seen on our Scottish east coast in summer nuptial dress.

The curious absence of life during migrational seasons frequently commented upon by us on a certain very considerable extent of coast line from Caithness south to the Bell Rock, cannot be entirely accounted for, by the unfavourable positions, circumstances or brilliancy of the lights used ; nor certainly in very many cases, is it from lack of interest in the Light Housekeepers ; because on removing to more favoured stations, several of these observers have, at once, sent well filled schedules.

We are not allowed to theorise, else nothing could be easier, otherwise we might talk of ancient highways of migration, ancient sea levels, old submergence of land and upheavals, and compare the great marshes of Holland with the Broads of Norfolk—at one time, not so very far distant, one continuous swamp—we might talk about the old world history of geological epochs, and the tear and wear of centuries, the ice-ages and the glaciers and remains of ancient Britain. We might dive into still deeper mysteries of ever changing temperatures dependant thereon ; go back to an infinitude of distance in time before ever such problems were presented to the human understanding or thought, and revel in speculative fancies and theories until we came to believe in them ourselves. Ours is the work to collect the data, to reduce the facts as far as possible, to start from the embryo of all such inquiries, and in our own given time to state results so far as have been arrived at. To others who, it may be, have really seen less of the working of this interesting subject ; or to others who, on the other

* A somewhat curious fact, however, is that the knot is rare *at any season* in the Dornoch Firth or east coast of Sutherland, and much scarcer, north of Tay than South of it, either in Spring or Autumn, instancing perhaps our remarks in the text. The same remarks apply to many other species.

hand, have carefully studied the subject apart from our observations, and at the same time have accumulated facts, and have cross-questioned earlier theories; to them we leave the theoretical part at present. But, while stating all this, we still *do* feel curious, and desirous of further corroborative proofs of the extraordinary absence of migration upon that portion of our eastern coast line lying between Caithness and Bell Rock. I know that even upon land on the east coast of Sutherland, Waders, Warblers, and other *actual birds of passage* are usually *rare*. Under very exceptional circumstances do any great migrations appear there; though the Caithness east coast is perhaps rather oftener favoured.

Let us only gently whisper, that it seems to us within the bounds of possibility that theoretically Weissman is right, and that greater attention must, and with justice, be paid to his article in the *Contemporary Review* on this subject. The several times recorded occurrence of spring migrants upon the east coast of Caithness seems now easy of explanation, and can scarcely be designated theoretical. Thus, the Blackcap has occurred on the Caithness east coast in Spring, several times numerously, and has been recorded. One of the highways of migration undoubtedly is the Pentland Firth (witness the extraordinary rush of both spring and autumn migrants at Pentland Skerries —equalled and exceeded only by those at Isle of May, as well as the exceptional or occasional occurrence of such species there, as the Black Redstart (also recorded from the Isle of May). Granted then that the Pentland Firth *is* a highway of migration and that—as has been shown, and is now undisputed—birds prefer to fly with a beam wind on migration; the appearance of spring migrants, bound for Europe, upon the East Coast of Caithness is easily accounted for not theoretically, but from established data from other localities under similar circumstances. Birds flying long flights against a beam wind, though less easily tired and exhausted—unless these winds reach the strength of half or a whole gale—than if flying with a following wind which ruffles up their plumage, and destroys their steering power—nevertheless desire refuge and rest before facing their further flight over the North Sea. Flying eastward through the Pentland Firth, say against a S.E. or S.S.E. wind, they naturally cut off across the peninsular portion of Caith-

ness, and if weather-beaten, wearied out, or hungry, drop for shelter, rest, or food, before resuming their travel. This seems to me to be adequately borne out by our statistics, not only of that part of our coast, but by similar grouping of circumstances elsewhere within the range of our inquiry. I need only instance the Woodcocks already spoken of, as returning across the isthmus between Clyde and Forth, resting in the Stirlingshire area of that district, and suddenly and with favourable wind, "lighting" and passing clean away once more to their breeding haunts in Scandinavia and the Continent.

As my colleague—Mr Cordeaux—can always point out the uninterrupted streams of migrants coming across the North Sea, skimming over the shallower seas of the Dogger Bank, and the waters which separate Holland from England, so I, situated further north, can point out the much more broken up, interrupted migration which appears upon our Scottish Coasts, north of Bell Rock. I say, I can point to this, but I refuse to account for it. I believe the situation of lights, and their brilliancy, their altitude, on our Scottish Coasts, compares unfavourably with the lower elevated, more isolated lights of the English East Coast, which surely are bound to attract birds to an unusual degree in a North-sea fog or haze. Yet I decline to receive these differences of situation, and circumstances or stations as a complete illustration of the why and the wherefore of the differences of numbers and of species immigrating to the East Coast of England as compared with those coming to the East Coast of Scotland.

Perhaps—I only whisper it—a study of the old 100 fathom depths round Great Britain as shewn in the map I have before me when writing this paper, may reveal more distant causes hinted at in the theory of Herr Weissman—viz., that of the old land communications, and gradual submergences and upheavals in the Northern Hemisphere. Those who desire to depart from our stumbling and rough road of hard and macadamised accumulation of facts, and jump at once into the seas and easy, wavy, motions of theory, should read Dr Weissman's article, which is full of suggestive reasoning, theoretical though it undoubtedly is.

Regarding the altitude at which bird-migrants travel, we have good authority for stating that an ascertained height of four miles has been recorded by American astronomers. At that vast height the world and the seas lie mapped beneath, as even,

amongst human beings, the balloonist knows. It is a picture—a bird's eye-view, *indeed* and in truth. In clear weather if a sailor can see the horizon at from 12 to 15 miles distance from the crow's nest in his ship, how far will a bird see before him, at an elevation of four miles? That will depend upon the power of vision.

But if, underneath the travelling migrants, the weather changes, and clouds and fogs or haze obscure the birds' eye-view, then, as is well known, they descend rapidly towards the earth, lest they should wander aimlessly away through limitless areas of cloudland. An area beneath them enveloped in fog, means land in the midst of ocean, a resting place for the soles of their feet, food, rest, and quiet and recruited strength. When the fog clears off they continue their flight, reascend to higher levels, regulated in their movements by currents of air, clearness of weather, and season of the year, temperature, and such like natural causes.

Time-worn channels of migration over land can even now be recognized and accepted. Certain valleys, certain undulations of the land, certain passes in the mountains are year after year followed by the bird migrants, and certain sites of the breeding places of certain birds are year after year occupied. After many years, possibly the old birds of these nesting places die off, and the sites may remain unoccupied for many years to come. But even as young salmon descend to the sea, and have been ascertained to reascend to their parents' spawning grounds, so do young birds find their way back to their parents' nesting sites, and reoccupy the temporarily deserted homes. Migration and distribution act and react upon one another, influence and are influenced by one another, increase or diminish their areas simultaneously; are indeed part and parcel of the marvellous plan of creation and organization, of which the more we know, the smaller part do we ourselves appear. There is, I honestly believe, nothing which, in a more pleasant and agreeable way, takes out of man the inborn conceit than a knowledge and study—however superficial, if earnest—(and not artificial or selfish, or undertaken for the mere sake of worldly κυδος)—of Nature and her marvellous works. And there is an everlasting pleasure in the assurance that the more that is known, the more still remains to be discovered. Nature is an inexhaustible fountain of the purest water destined *never* to fail; and though we are told that we cannot *know* all things, we are not forbidden to *try* and find them out.

Having for many years paid attention to local names of Birds throughout Scotland, and thinking the following notes may be of value to the Stirling Natural History and Archæological Society, I add them for an appendix to this paper. Members of the Society interested, might very likely add largely to the List of Stirlingshire local names of birds and other animals, or even of plants. I will at all times be happy to receive any such additions, or any corrections of the following confessedly imperfect list.

Redstart—Fire-tail, Fire-flirt, Red-tail.

Robin—Bob-robin, Robin-redbreast.

Stone Chat—Stone-chacker, Stone-chatter, Stone-clink, Stone-smith. (The first two names are also applied by some to the Wheatear.)

Whinchat—Grass-chat.

Wheatear—White-rump, Dyke-hopper, (v. also under Stone-chat).

Missel Thrush—Storm-cock, Screech Thrush, Felti, Felti flyer. (The names of the Missel Thrush and Fieldfare are exchangeable; the first being properly applied to the latter species, has by confusion come to be applied also to the former. The appearance of the Fieldfare is supposed to precede a storm. The names Felti and Feltiflyer are in like manner applied to both species.)

Common Thrush—Mavie.

Blackbird—Blackie, Blackie-bird.

Ring Ouzel—Mountain or Moor Blackbird, Rock-blackbird.

Dipper—Water-craw, Water-piet, Bessy-dooker.

Wren—Kitty Wren, Jenny Wren.

Willow Wren—Hay Bird, Ground Wren, Smew or Smeuth.

White Throat—Nettle-creeper, Chirmuffit. (The first of these names is also used in the North Riding of Yorkshire (Zoologist 1878, p. 292), and I have heard it used in Midlothian. The second name is doubtless applied on account of the peculiar churring note, and the muffler-like tuft of feathers on the throat.)

Wood Warbler—Wood Wren, Yellow Wren. (But this and the Willow Wren are not as a rule distinguished.)

Great Tit—Ox-eye, Black-headed Tomtit.

Blue Tit—Blue bonnet, Blue cap.

Cole Tit—Coal head, Black cap. (The former, however, is also applied by some to the Reed-bunting.)

Long-tailed Tit—Bottle Tom, Oven-builder.

Pied Wagtail—Nanny Wash tail, Dish-washer.

Great Grey Shrike—Butcher bird.

Yellow Wagtail—Cow bird, Cow klit.

Meadow Pipit—Moss-cheeper, Moss-cheepuck, Titling.

Hedge Sparrow—Blue Sparrow, Buss Sparrow. (The former

from the colour of its eggs; the latter from its frequenting low *bushes* or hedgerows. Also, Hempie, Blue Tom.)

Bullfinch—Bully, Bulfinch.

Green Finch—Green lintie.

Lesser Redpole—Red-headed Finch, Rose lintie.

Linnet—Lintie, Heather lintie, Rose lintie. (The second name in some parts of Scotland is applied more correctly to the Twite, but here it also does service for the present species, *Whin-lintie*.)

Goldfinch—Goldie, Thistle finch.

Chaffinch—Shilfie, Wet bird, Spink.

Brambling—Cock o' the North.

Bunting—Corn buntling.

Yellow Hammer—Yite, Yellow Yite, Yellow Yeldrock.

Reed Bunting—Coaly head (see also under Cole Tit).

Snow Bunting—Snow flake.

Magpie—Piet.

Rook—Craw (almost universally over Scotland).

Raven—Corbie Craw.

Hooded Crow—Hoodie.

Tree creeper—Tree speeler.

Sand Martin—Sandy Swallow.

Sky Lark—Laverock, Field Lark.

Cuckoo—The name Gowk is almost if not quite obsolete. *Horse-gowk* was used also, and it has been suggested to me that this name was applied as to anything that frightens horses.

Nightjar—Wheel bird, Night-hawk, Goatsucker.

Swift—Cran, Black-martin.

Kingfisher—Kingsfisher. (This name throughout the Highland districts of Scotland is also applied very generally to the Dipper, but in this county it is applied to the present species.)

Ring Dove—Cushie.

Barn Owl—White hoolet.

Long Eared Owl—Horned hoolet.

Tawny Owl—Brown hoolet.

Sparrow Hawk—Blue hawk.

Buzzard—Glead. (Also applied to the Kite, and probably now misapplied to the Buzzard.)

Peregrine Falcon—Game hawk.

Merlin—Small blue hawk.

Kestrel—Red hawk.

Kite—Glead or Gled.

Red Grouse—Muir fowl.

Partridge—Pairtrick.

Common Bittern—Mire drum, Bog bumper.

Heron—Crane, Craigie Heron.

Curlew—Whaap, Whaup.

Willy Wicket—Common Sandpiper, Skittery deacon, Sand

lark, Summer snipe. (The former from a well-known habit when it rises to fly.)

Redshank—Sand cock, Red-legged horseman.

Dunlin—Pickerel, Sea snipe, Sea lark. (Under this first name almost all shore-birds are classed large and small by the gunners on the coast. "Oxbird" is also used, but is an importation by English gunners.)

Lapwing—Peesweep.

Knot—Grey Plover (and Silver Plover on the coast). (The Grey Plover *(squatarola helvetica)* is not generally recognised.)

Oyster-catcher—Sea piet.

orn Crake—Corn craig.

Coot—Baldie, or Bald Coot.

Common Arctic Tern—Sea Swallow.

Sea Gulls—Maws, Sea Maws.

Glaucous Gull—Golden Maw.

Puffin—Tammie Norie.

Little Grebe—Mither o' the Mawkins. (Mawkin is the local Scotch for Hare—Mother of the Hares. Grey Mawkin or Grimalkin, the name for a cat, is the same word, but I have not been able to trace the origin of its application to the Little Grebe in this connection.)

Gannet—Bass Goose. (This is not generally applied, but I have heard it used by people in the low carse lands of Falkirk. Most Sea-ducks are called Dookers, but the name is specially applied to such as occasionally visit fresh water, such as Golden Eye or Tufted Duck.)

Red-breasted Merganser—Sawbill.

The usual monthly meeting of the Stirling Natural History and Archæological Society was held in the Smith Institute on Tuesday evening, 5th May—Rev. Mr Goldie presiding. There was a large attendance of members and friends. The minutes of former meeting having been read by Mr D. Chrystal, secretary, and approved of, Mr Goldie said he was sorry to have to preside that evening through the serious illness of Mr Croall. Within the last few days, however, a decided improvement had taken place in Mr Croall's state, and he hoped this good progress would be maintained, and that the Society would have the pleasure of seeing their President among them again at no distant period. Mr Goldie then introduced the lecturer of the evening, the Rev. Dr Ross, Bridge of Allan, who read a highly interesting paper entitled "Notes on the Early History of the Parish of Logie." At the close a desultory conversation ensued on several points

of interest, after which the Rev. Mr Ormond moved a very cordial vote of thanks to Dr Ross for his admirable lecture. Dr Ross had recently published two works, "Pastoral Work in Covenanting Times" and "The History of Busby and neighbourhood," and the same attractiveness and thoroughness, the same beauty of style, were manifest in the lecture as in these works. The lecture that evening was really the introduction to a larger work, and he hoped Dr Ross would be spared to complete his investigations, and to produce for the parish of Logie a work of similar value to that on which he was presently engaged for Aberdour. Dr Ross had come to-night at considerable trouble to himself to deliver this lecture, and he (Mr Ormond) hoped they would accord him a hearty vote of thanks. Mr Goldie had much pleasure in seconding Mr Ormond's motion, and he thereafter formally conveyed to Dr Ross the thanks of the meeting. Dr Ross briefly returned thanks, after which the meeting separated. The following specimens were exhibited by Mr Sword :—Nest of raven from cliff of Ben Lomond with eggs; nest of Dome-builders (blue-tailed tit); Perigrine falcon (male). The following is an abstract of Dr Ross's paper :—

Alex. Hume.

Alexander Hume, to whom I refer, was a son of Patrick Hume of Polwarth, whose lineal descendant became Baron Polwarth and Earl of Marchmont. This Patrick Hume was a great promoter of the Reformation, and was one of the Scotch barons who entered into a bond to protect and defend the ministers of the Reformed faith. On the breaking out of the civil war between Queen Mary's partizans and those who rallied round the standard of the infant King, Patrick Hume, as might have been expected, cast in his lot with the latter party; and he received a severe wound in one of their conflicts. He married Agnes, a daughter of Alexander Hume of Manderston, by whom he had six sons and three daughters. Alexander, the second of these sons, was the future minister of Logie. He was born about the year 1560, and so his boyhood must have been spent amidst the stirring scenes of the Reformation movement. After studying in the University of St Andrews, he repaired to France, where he spent four years in the study of civil law. He then devoted three years to attendance on the Courts of Justice at home; but the corrupt practices which

he found so prevalent in these courts filled him with dislike to the profession, and he abandoned it. Having made a vain attempt to procure secular advancement by dancing attendance at Court, his efforts took a higher and better direction; and after a careful study of theology, he devoted himself to the church. We have already seen that with the years 1596 the Church of Logie had been under the patronage of the Nuns of North Berwick, but that it had in that year been resigned into the hands of the king by Dame Margaret Hume, the prioress, a member of the Polwarth family. There can be little doubt that it was through the influence of that family that Alexander Hume became minister of Logie when the charge became vacant, by the death of the previous minister, in 1597. At this time Mr Hume was in the thirty-seventh year of his age, and his ministry in the parish extended over a period of twelve years.

Owing to the non-preservation of the session record of the time, we have no accurate information regarding Mr Hume's pastoral methods and labours; but what we know of him, from other sources, leaves no doubt that he was an earnest spiritually-minded man, and a consistent defender of the Presbyterian polity and liberty of the church. At his leisure hours, he courted the muse of poetry, and has gained for himself a noticeable place among the minor minstrels of our country. In 1599 he published a volume entitled "Hymns and Sacred Songs," which for a time—sharing the fate of much of the lighter literature of the period—fell out of notice, and was only rescued from threatened oblivion, within the present century, by Dr John Leyden, and Thomas Campbell, the author of the "Pleasures of Hope." The latter speaks of it as exhibiting in some of its verses, "a train of imagery that seems peculiarly pleasing and unborrowed—the pictures of a poetical mind, humble but genuine in its cast."

In addition to this volume of Hymns and Sacred Songs (as we learn from Dr Hew Scott's "Fasti Ecclesiæ Scoticanæ," to which we have been indebted for some other facts), Hume also published a treatise on "Conscience;" another on the "Felicitie of the World to Come;" "Four Discourses of Praise to God;" and "Ane Afald Admonition to the Ministerie of Scotland," in which he advises his brethren to abide by the good old government of the kirk. This was his last work, being published in 1609, the year in which he died, at the comparatively early age of 49. Mr Hume married Marion,

daughter of Mr John Duncanson, who had been a member of the Chapter of St Andrews, prior to the Reformation: then Principal of St Leonard's College, there; and last of all, Dean of the Chapel Royal of Stirling. His wife, two daughters, and a son survived him. Dr Scott has given us some extracts from the Inventory of Mr Hume's effects, and his Last Will and Testament, which give us interesting glimpses of his study, his domestic circle, his more immediate friends, and the ties that bound him to the highest things of all. His library was evidently well stored; for his books were valued at £36 13s 4d, which was a large sum in these days. One of his books had been borrowed by the "Guidman of Menstrie" (apparently Sir William Alexander, afterwards Earl of Stirling)—the volume being "Cornelius Aggrippa;" but it is bequeathed to his "rycht honourabill" friend. His neighbour ministers, Mr John Gillespie, of Alva, and Mr Ninian Drummond, of Dunblane, are to have such of his books as they please to select, when they have examined his library. We get glimpses of his domestic circle too. He appoints his wife and his children, Dinah, Naomi, and Caleb—all bearing scripture names you will notice—as executors of his will. To his spouse he leaves "ane grit signit of ane unce wecht of gold," in remembrance of his love. To his sister, Lady Law, the wife of David Hume, of Law, he leaves "ane peice of gold, of ane uncoutt cunyie," *i.e.* a strange or foreign coinage. To his "gossope" or intimate friend, John Scherer, a burgess, and one of the bailies of Stirling, he bequeathes "ane ring of gold, of raisit wark, about an angell weicht," in remembrance of his special love. To his brother, Sir John Hume, of North Berwick, who had been Provost of Edinburgh, and who had been sent as an Ambassador to the Court of England, he leaves a "peice of gold of ane strange cunyie"—of which he seems to have had a good many to bestow—in token of his good remembrance, and in hope that the recipient will be a father to the children about to be left fatherless. To his brother George, of Belyhose, he gives another of these foreign gold coins, in the hope that he will be a brother to the testator's widow, and a father to his children. It becomes evident, too, that the cultivation of music has had a place in the old manse of Logie, nearly three centuries ago; for Mr Hume ordains that the lute which belongs to one of his daughters, and which the "Gudeman of Menstrie"—who seems to have

had rather a facility in the way of borrowing—had in his possession, should be restored to her again. And there is another musical instrument in the manse, and belonging to the testator, which is to be given to Mr Andrew Young, minister of Dunblane, that he may bestow it on whom he pleases. To several of his personal friends he leaves his love and blessing; and he requests a few of them, who are named (William Alexander of Menstrie the future Earl) to act as counsellors to his wife and children. Last of all, he leaves his hearty affection to all his friends and relatives who love the Lord Jesus. He exhorts them to be religious; to be true in their dealings, the one with the other; and to love one another as the Lord Jesus has loved them. "And thus," says he, "I fulfil my course with joy." And yet this is the man of whom George Gilfillan, in noticing his poetry, says that after being settled in the parish of Logie, "he darkened into a sour and savage Calvinist." I think those who have been at some pains to acquaint themselves with Alexander Hume's life, and labours, and spirit, as a poet, a minister, and a Christian man, will agree with me in thinking that we could stand a good many more "sour and savage Calvinists" of Hume's stamp.

A meeting of the Stirling Natural History and Archæological Society, specially summoned to record the loss sustained by it through the death of the president, Mr Alexander Croall, was held in the Smith Institute on Tuesday, 2d June. at 8 o'clock. The Rev. Mr Goldie, vice-president, took the chair, and there was a fair attendance of ladies and gentlemen. Mr Goldie having stated the object for which the meeting was called, read the following memorial notice of Mr Croall's life and labours:—

THE LATE ALEXANDER CROALL.

We meet this evening under the shadow of a great loss in the removal by death of our accomplished and much esteemed acting president, Mr Alexander Croall. We cannot say that the event was unexpected, for though hopes were entertained by some up till a recent date that he might again appear amongst us, it has been evident to practised eyes for some time that his end was approaching. Probably but for him this society had never existed, and certainly but for his wise and earnest management the society had not done its work so well. Our acting president from the first, he never was

absent from his place in the meetings of the council or of the society except when prevented by illness. He was a hard worker in the interests of the society. His time, talents, and extensive information were always at our service. He contributed a number of papers of special interest and value. He gave a tone to all our meetings. His spirit and example were stimulating, and there are members who will be ready to acknowledge their indebtedness to him in their respective departments of study. Nothing was indifferent to him, and every subject brought before us secured his interest and his sympathy. He was most anxious that we should work up the botany, zoology, geology, and archæology of the district, hence the committees that were formed, and the Saturday excursions of which, even when beyond the three score and ten years, he was the leading spirit. He thought the society should be mainly local in its researches and its aims, should observe and record what was interesting, and hence he preferred brief papers on local subjects, the reading of which gave rise to questions and discussions. But though the society had never fully realised his idea, he was most grateful for what had been accomplished. We cannot as yet fully realise the influence he has exerted, and the work he has done amongst us, and consequently cannot fully realise the loss we have sustained by his removal.

It is understood that some time ago an eminent literary man had offered to write a memoir of Mr Croall, but Mr Croall declined, preferring to do the work himself, and he was engaged upon it when overtaken by his last illness. The narrative, however, comes no further down than 1835. We can now only suppose how interesting the work would have been written by one who was such an ardent lover and keen observer of nature, and who would have invested his pages with the charms of delicate feeling and fancy. He has, however, left sufficient materials for a complete memoir which cannot fail to be interesting and valuable, and which, it is to be hoped, will be given to the world with the least possible delay.

I have been favoured with the following genial and interesting notice by Dr Howden, the accomplished Superintendent of Sunnyside Asylum, Montrose, an intimate friend and a great admirer of our late president. "Alexander Croall was born near Brechin in 1809. He served his apprenticeship as a joiner, and, at a very early age, displayed a love for books and natural history. When young his

health was delicate, and he probably abandoned his trade on that account, [and studied for nearly two sessions at the University of Aberdeen.] The first school he taught was in Ferry Street, Montrose, and the next was in a "clay biggin" at Loanhead, 2½ miles from Montrose, to which he was appointed in 1839. In September, 1841, he was appointed to the parish school of Guthrie. From that he went to Stratton's School in Montrose, when I first knew him in 1857. About 1859 he was transferred to the new Sessional Schoolhouse built at Loanhead, and it was while there that he wrote most of "The British Seaweeds." I have not been able to find any of his early intimate friends in Montrose, but many remember him 40 years ago as an enthusiastic Naturalist and the leading spirit in the "Scientific Institute," members of which have survived the long since defunct society. It was a common practice with him in those days to start for the hills on a Friday, or any other night before a school holiday, at twelve o'clock, so that he might be on the botanising ground by daylight, and get home the same evening after a walk of 30 or 40 miles. During the autumn holidays, he made prolonged excursions to Clova, Deeside, &c., and on those occasions he commonly slept on the heather, carrying his slender commissariat in his pocket. While he was a recognised authority in botany, and numbered among his correspondents Balfour, Dickie, Hooker, Darwin, and other eminent botanists, he had a very wide and accurate knowledge of natural science generally, and probably knew the zoology of this (the Montrose) district better than any one else. About the year 1855, he was employed by Sir William Hooker to prepare a Herbarium of the plants of Braemar for Her Majesty the Queen, but his great work was the "British Sea Weeds: Nature Printed," published by Bradbury & Evans in 1860. Modest, truthful, and honest himself, Croall credited others with the same qualities often to his own loss. The "British Sea Weeds" was nominally the joint production of W. G. Johnstone and Alexander Croall, but I have reason to know that nearly the whole of the work devolved on Croall, while the remuneration went to Johnstone, who died, or in some other way conveniently vanished before accounts were squared between them. I knew Croall intimately when he was preparing this book. His days were spent in the drudgery of teaching an elementary school, while the nights were devoted to literary work, leaving him little time for sleep. The microscopic

drawings were by himself, as was also the letter-press. The illustrations were nature printed." It may here be added by way of note that this beautiful process has been lost to science by the death of its inventor, Mr Bradbury.

Although Mr Croall had at an early age manifested a love for natural science, it was not until he was a teacher that he began in real earnest the study of botany, incited thereto by hearing a journeyman gardener read a paper on "Plants." From that time, until the end of his days, he prosecuted the study with great ardour. As a member of the "Montrose Scientific Institute" already referred to, he took charge of the botanical, while Dr Gilchrist, afterwards of the Crichton Institution, Dumfries, took charge of the geological, department. Mr Croall had also charge of the entomological department, and made a valuable collection of insects, which, on leaving the place, he presented as a free gift to the Montrose Museum. In 1863, he was appointed librarian to the City of Derby Library and Keeper of the Museum and Herbarium. So long as he remained in England, he, when time allowed, prosecuted his favourite studies, and during his holidays took excursions into Cornwall, and other counties, gathering treasures wherever he went.

In 1873, he was appointed curator of the Smith Institute, Stirling, which with its picture gallery, its Museum, and latterly its extensive library, situated in a district rich in objects of natural science and of archæology, was most congenial to his tastes. Never was there a happier appointment, and never was a man more happy in his situation. The trustees, to their credit, placed unbounded confidence in him, and so thoroughly did he identify himself with the place that his name and that of the Institute had become, in the popular mind, almost synonomous terms. People from all parts consulted him on many subjects—objects rather—of natural science and of archæology, and he met them in such a genial spirit that he seemed really to thank them for giving him the trouble. No one consulted him on such occasions without being impressed with the extent and accuracy of his information, and with his kindly obliging disposition.

From what has been said a fair idea may be obtained of Mr Croall's scientific enthusiasm; and it only remains that we give a general statement of his scientific attainments, and in doing so I am almost entirely indebted to one who knew Mr Croall inti-

mately, and is himself no mean naturalist. Before going further, however, I may say that Mr Croall, latterly at least, took a deep interest in archæology —the archæology of this district especially—and knew not a little of it as a science. But he was most at home in the region of nature. He knew something of mineralogy, and in geology he was anything but a tyro, although he had not given the same attention to it as to some other branches of science. As we have been told already, he was a good zoologist, especially in conchology and entomology. He was, however, strongest in botany. He had made a special study of the fungi and lichens, and he was an expert in mosses, and his name frequently appears in Dr Braithwaite's "British Moss Flora," now in course of publication. His great work on "British Sea Weeds" has already been referred to. His knowledge of the flowering plants was most extensive, and he may fairly be regarded as one of the best of British botanists. He has left a valuable scientific collection behind him. The specimens belonging to this district—and he had explored the country round, and made himself especially acquainted with its flora—the specimens so acquired he has bequeathed to this Society, and I am sure we receive them with gratitude, and will treasure them not only for their own value, but for their donor's sake. However the other specimens may be disposed of, I am certain they will be treated with more respect than the valuable collection of Robert Dick, which I saw lying like so much rubbish in a public room in Thurso.* Mr Croall has also left a garden of wild flowers gathered in various parts, some of them not to be found in Scotland. It is well worthy of a visit, and botanists may regard it as worthy of preservation.

Mr Croall, I need hardly say, was a man of shrewd and patient intellect, keen to observe, to analyse, and generalise, but slow to speculate. He was a man of facts, not of fancies. He never bridged a chasm by conjecture, but waited until it was filled up by facts. He deprecated the putting forth of mere hypotheses as if they were established theories. Being anxious to ascertain his attitude with refer-

* This is not so now. Dick's collection, we understand, has since been properly arranged under the superintendence of Mr Gunn, a subscription having been raised for that purpose. The Stirling Natural History and Archæological Society can claim some credit in the matter, one of members being a prominent subscriber.—ED. *S. J. & A.*

ence to the doctrine of evolution, I put the question to him on the last occasion on which I spoke with him on any scientific subject. His reply, as usual, was moderate and cautious. He did not think that parties on either side were in a position to dogmatise. Evolution was a good working hypothesis, but little more as yet. In his own department of botany there were endless "sportings" or variations in plants, but so far as he knew, no undoubted transformation of species had as yet been discovered. Still we should keep our minds open for further light. One thing he was certain of, facts alone, and not speculations would settle the question if it ever was to be settled.

Mr Croall was a man of singularly beautiful and attractive character. His amiability, modesty, courtesy, charity, unselfishness were conspicuous. Dr Howden says in the letter from which I have already quoted—"Croall's modesty amounted to bashfulness, and tho' his extensive and accurate knowledge fitted him for a foremost place as a scientist, he shrunk from asking favours, or seeking what worldly advancement his accomplishments well entitled him to. Gentleness and charity were eminent characteristics of his nature, and he was never heard to say a disparaging or unkind word of any one, and I would hardly imagine that he ever had an enemy." This is just Mr Croall as we knew him. And his fine natural character was hallowed by his Christian spirit—for he was a Christian in the truest sense of that word. In him the religious and scientific characters were remarkably combined. He was the man whom Henry Kirke White longed to see—

> "Oh! I would walk a weary journey to the furthest verge
> Of the big world, to kiss that good man's hand,
> Who in the blaze of wisdom and of art,
> Preserves a lowly mind; and to his God,
> Feeling the Sense of his own littleness,
> Is as a child in meek simplicity."

I am sure we all sincerely and deeply sympathise with the widow and her family in their sore bereavement. It is an uncomfortable reflection that such a man should have received no public acknowledgement during his life time—and is it too much to hope that a sort of atonement will be made by a government pension to her who was so long his faithful partner. Such a thing has been done in many cases far less worthy. It is also to be hoped that erelong a monument worthy of him will adorn our beautiful cemetery—but of one thing we may be sure

he would have regarded the continued existence and success of this society as his best monument—or one of his best.

At the close, Mr Alexander Moyes said that after the admirably appreciative paper which had just been read, any further statement on his part would savour of presumption. He would, therefore, simply move that the following resolution, which had been prepared by their Secretary, be recorded in the minutes of the society, and that an extract be sent to Mrs Croall and her family :—

"The Society desires to record its deep sense of the loss which it has sustained through the death of its lamented president, Mr Alexander Croall, whose services, first in its foundation, and afterwards in connection with its prosperity, and the attainment of its objects, were of the highest kind. In all departments of its work, but specially in his own branch of botany, Mr Croall laboured, not only with zeal, but also with marked success. His death makes a blank which it will be impossible to fill, and the Society feel that their loss is indeed no common one. The Society further desires to express its sympathy with Mrs Croall and the members of her family in this, their time of trial."

This was seconded by ex-Dean of Guild Shearer, who spoke in feeling terms of Mr Croall's kindly qualities as a neighbour, and of the great loss the Society and the town of Stirling had sustained by the death of one whose character might be summed up in the Scriptural saying—"Behold an Israelite indeed, in whom there is no guile." The meeting then separated.

The annual monthly meeting of the above society was held in the Smith Institute on Tuesday, 2d Sept.—Rev. Mr Goldie presiding. Owing to other meetings in the town at the same hour the attendance was rather small. This was regretted by the Chairman in his opening speech, who hoped, however, that during the winter the attendance would be kept up by members, not only out of regard for the society itself, but out of respect to the memory of their late president, Mr Croall, who had devoted so large a portion of his time and attention to the furtherance of its interests. Mr Goldie then called upon Mr D. Chrystal, secretary, who read minutes of two previous meetings. Thereafter a paper, prepared by Mrs Hogg, and entitled "Extracts from the Kirk Session Book of Culross, 17th Century," was read by Mr Chrystal. At the close a short conversation ensued on various points touched upon in the paper, such as the old belief in the virtue of the rowan tree as a charm against witchcraft, old

superstitious observances, &c. An interesting ornithological paper with the title, "Notes by the way," giving an account of the birds of the district, was read by Mr Gilbert M'Dougall. Votes of thanks to Mrs Hogg and to Mr M'Dougall for their papers, and to Mr Goldie for his conduct in the chair, closed the proceedings. The following specimen's were submitted for exhibition :—Bittern, shot on Cowie Moss, near Stirling, in 1882, and presented to Smith Institute by Mr David Bruce, Clarendon Place; eggs of Cuckoo, taken at Cockhill Moor, near Callander, and kindly sent for exhibition by J. W. Campbell, Esq., Bank of Scotland; nest and eggs of Dipper; Peregrine Falcon and eggs; nest and eggs of long-tailed Tit; blackheaded Gull, Stirlingshire, 1885; Ring Ouzel, with nest and eggs, and with nest and eggs of Jay, all sent for exhibition by Mr Sword.

EXTRACTS FROM THE KIRK SESSION BOOK OF CULROSS.—17TH CENTURY.

(By Mrs Hogg.)

Before proceeding to the subject proper of this paper, I may here briefly explain how these "Extracts" came into my hands. It may be remembered that on the Queen's Birthday, 1882, a Field Club Excursion was organized to Culross. The morning was rather unfavourable as to weather, but nevertheless a goodly number of members of the Club met at Stirling Station, and after a pleasant journey by rail and by road, we found ourselves in the quaint old town. Unfortunately the precaution of securing beforehand the services of a competent *cicerone* had not suggested itself to us, and so we were rather in a dilemma, as none of the party knew the place or the whereabouts of the various objects of antiquarian or archæological interest we had come to visit. We found our way to Dunimarle, a beautiful modern residence built near the site of Macduff's ancient castle, and were admitted to the grounds and gardens; but the mansion-house, with its antiquarian and art-treasures, was closed, and not even the potent name or influence of a Stirling Dean of Guild sufficed as an "Open Sesame." In our extremity we bethought ourselves of Mr Penney, the respected Session Clerk and Schoolmaster of Culross, and knowing his genial goodheartedness, we resolved to throw ourselves on his kindness, and ask him to be for the nonce, our "guide, philosopher, and friend." We were most kindly received. Mr Penney entered heartily into the object of our

visit, and personally conducted us to the various places of interest in the town. Hearing, moreover, that a paper descriptive of the Excursion was to be read at the forthcoming meeting of the Club in June, he very kindly furnished us with all the literature at his command bearing upon the various antiquities of the burgh. This literature included—

"A Historical Description of Dunimarle and its Antiquities;" "Poetical Maxims from a painted room in the old house called 'The Palace,' with Notes of the building and prebable founder," by G Gervase, Esq., Corr, F.S.A. Scot.; "Notes on the Secular and Ecclesiastical Antiquities of Culross," by the Rev. Arthur Hallen, M.A., F.S.A., Alloa;" "The Letter of Confirmation" granted to the girdle-makers of Culross, by James VI in 1597; and "Extracts from the Kirk Session Book of Culross—17th Century."

The first four of these formed the bases of an interesting paper, prepared by the Rev. J. E. H. Thomson, which was held to be read at the June meeting of the society, 1882, and which may be found in the "Transactions" for that year. The last I have now the honour to lay before you.

The first extract from the minutes is dated 30th January, 1631, and the last 12th May, 1646, so that they cover a period of fifteen years. No part of Scottish history, if we except the Wars of Independence, is so full of interest as that portion between 1633 and 1660. In 1625, Charles I. ascended the throne, and in 1633, he came to Scotland to be crowned with the crown of his ancestors. The Church of Scotland was then Episcopal, "more episcopal" according to Dr Cunningham of Crieff "than she had been since the Reformation." But in 1637 occurred the Jenny Geddes episode and following in quick succession came the signing of the Solemn League and Covenant, the Glasgow General Assembly, under the Moderatorship of Alexander Henderson of Leuchars, which overturned the whole fabric of Episcopacy and restored Presbyterianism in its power and purity, the Civil Wars in Scotland and in England, and finally in 1649 the tragedy at Whitehall. No echoes of these deadly struggles, however, are to be found in the 'Extracts' before us. Culross was at this date at the very height of its commercial prosperity. James IV. had conferred upon the smiths of the burgh the exclusive monopoly of making girdles—then indispensable articles in Scottish households—and James VI. in 1599 had renewed or confirmed the grant, so that the craft was wealthy and powerful. Coal mines were extensively worked, and salt was largely produced. The salt pans of

Culross numbered at that time fifty, with a weekly out-put of one hundred tons, and prior to the Union it was no uncommon thing for 170 foreign vessels to lie at one time in the roadstead waiting for cargoes of these commodities. As to the state of religion and morals, it was as Dr M'Crie says, "very peculiar." And this remark applies to Culross, as to other parishes in Scotland,—

"Some spots were favoured with a faithful ministry and richly cultivated while others were left to their native sterility, and the character of the people corresponded. In some parishes where the gospel was preached, piety flourished to an uncommon degree, and discipline was exercised with a rigour which in the present day would be considered intolerable; in other places the people remained destitute of all privilege and of all restraint in a state of ignorance, superstition and crime very little better than that which existed in the days of Popery. The country, in fact, was but partially civilized and the ministers had to contend, not only with the ordinary fruits of human depravity, but with strange forms of evil engendered in the shades of that long dark night from which they had lately escaped."

Culross was one of these "favoured spots," the minister Mr Robert Colvile, being "a good and godlie man and a faithful pastor." His death, however, occurred in the beginning of 1631, and the parish was in consequence plunged into the turmoil and excitement of a disputed settlement. The story as recorded in the "minutes" is interesting, and I shall endeavour to tell it as briefly and concisely as possible :—

"22nd February, 1631.—The quhilk day the session being convened and vehementlie grieved for the apparent loss of their dear pastor, Mr Robert Colvile, whom the Lord had stricken with a deadlie palise the sabbath before, about 2 afternoon, purposing to have taught afternoon as comfortable as he had been exercising his talent before noon, and perceaving by all appearance that his tym was but short, thought it expedient to send a loving letter to the Ordinary ye Bishope of Dunblane requesting him by reason of the unexpected visitation that he would be so favourable as not to hear or treat with any future sutars for that place, untyll the tyme he would be pleased to hear and advise with them, and trusting likewise it would be his fatherlie care to respect them in the matter of so great importance for God his glorie, and the good of yr. soules as being the greatest and chiefest congregation within his Lordship's dyosie"—

Adam Bellenden was at that time Bishop of Dunblane, he was translated to Aberdeen in 1635, and deposed in 1638. Upon the 25th of February the end came.

"The Amighty called his faithful, dear and worthy servant unto his rest a little before 8 o'clock at night, with the great lamentation of both ministers and others of his friends and dear auditers who with due observance had been still almost attending him from the tyme of his vesitation unto his blessed death with many tears and supplications."

On the 27th February, the Kirk-Session met, when a letter was read from the Bishop of Dunblane

"Importing his heavie displeasure for his dearest brother and cousin," and giving a "friendlie promise that he should doo in that purpose with their advyse and consent."

It was agreed to send a congratulatory letter to the Bishop thanking him "heartilie for his favourable answer," and they unanimously appointed that on Wednesday the 2d of March, "being the burial day of their umquhile deceast pastour," they should consult concerning the election of Commissioners and the nomination of "some good actuall minister who happilie would be pleased to tak upon him their heavie charge." This was accordingly done, and upon the following day (Thursday) John Erskine of Balgownie, Sir John Preston of Valleyfield, George Bruce of Carnock, Gilbert Gourlay of Wester Grange, and Edward Blair, Bailie of Culross, were elected Commissioners, and after due deliberation they nominated upon the leet of intending candidates, as we should call them :—

"Mr John Murray, Mr John Erskine, Mr John Spence, Mr Andrew Young, ane expectant Mr Mungo Murray, Mr Robert Melville. But amongst them all they set their affection upon Mr John Murray, bothe for soundness of doctrine and integretie of life, being ane free and not bound to any charge, and therefore apparantlie less malcontentment for transportation, but mainlie having means of his own would be content, with the meanness of our provision for Culross,"

and John Colville of Comrie, and Gilbert Gourlay, were appointed to be sent to the said "Mr John" to intimate their mind to him, and his answer to be reported the following Sunday on the "quhilk day the Session was ordainet to meet." On the Sunday accordingly, "Mr John's" answer was duly laid before the Session, and was to the effect that

"Finding a calling of the whole people, if the matter might be done with consent of the Kirk, to God His glorie, and the contentment of the godlie, and peace of his own conscience, and the edification of soules, that he would most gladlie undertake the condition of ane faithful helper, the means of whose maintenance he was most willing himself for the most part to yield, and not to lay burdens on the people since he hithertill now had never sought for onie earthlie reward nor stipend."

This answer, as might have been expected,

"Contentit all gladdlie with one accord, wishing earnestlie frae their heart that the Lord would bring the matter to pass for his praise and their good."

The call was then subscribed by "the chiefest," and the Commissioners were empowered to "nominat and entreat the Bishop for him and for his plantation at Culross." Some hitch, however, seems to have taken place in the arrangements, for

at a meeting held on 20th March the Commissioners reported

"That it was an impossibilitie to get Mr John Murray for reasons known to the Bishop and them which it was not expedient to put in write, and they thought it best to sett their minds upon Mr John Duncan present minister of Sauling (Saline) whom with the Bishops consent (being both qualified and of good report) they had sought, who also conditionallie had weill near yieldit and consented to be their minister."

The matter, however, was not be so easily settled. At a meeting held on the 3d of April, a letter was read from Bishop Bellenden "alledging that there was not such contentment (as he was informed) with Mr John Duncan his doctrine," and that he had received under his Majesty's hand a presentation in favour of Mr Robert Bruce, brother to the Laird of Earlshall. A letter recommending Mr Bruce was also read from Mr Alexander Henderson, minister of Leuchars, but the congregation were determined to resist the intrusion of the royal presentee to the utmost.

"The voyces of all being severally demanded to wit. Whether the whole gentlemen and other elders here convened, would retreat the proceedings with Mr John Duncan and so be content with Mr Robert Bruce, or not. Answered, everie one almost, that since they had proceeded orderlie with Mr John Duncan's election having one edict served publicklie, and all being done legallie, according to the Bishop's own warrant, and direction, that they would stand stedfastlie with Mr John Duncan to be their pastor, in the Lord, and therefore (however, Mr Robert Bruce was a good qualified gentleman) because of the premisses so orderlie done, that it was not needful to hear the said Mr Robert Bruce, now having made their choice already,"

and two Commissioners were appointed to go to the Bishop with a letter subscribed by them requesting again his Lordship's favour in their behalf. On the 10th April, the Commissioners reported that with

"Great entreatie, opposition, and difficultie they had obtained his Majesty's presentation subscrybed and sealed unto Mr John Duncan, and a promise of the Bishop's to come the 18th of this instant for his institution. *Item* because of much business that Earlshall and his friends was making for intruding of his brother on them without their calling or consent, therefore ordainit further to write 4 letters, one to the Bishope that his Lordship would be pleased to continue his favour and wou d haisten either before or at the appointed time for Mr John Duncan's admission; the 2nd letter direct to the Earle of Rothesse, that his Lordship would be so favourable as to deal with Earlshall's brother, to desist, otherwise to entreat for Sauling or some other place for him, the 3rd and 4th letters to be sent to Mr Alex. Henderson and Mr Bruce himself and all to desist for causes above written."

Four days after a letter was received from the Bishop, stating that he had been summoned at the

instance of Earlshall before the Secret Council at Edinburgh. The matter, however, seems to have gone no further. A minute dated 12th June is to the effect that

"The whole Session receaved Mr John Duncan to be their minister after that the Moderator of the Presbyterie of Dunfermling had made ane luculent sermon concerning ye duties of pastor and people, and had given the said Mr John Collation and institution according to the order of the Kirk, and satisfyed the Bishop's direction in all points."

BREACHES OF CHURCH DISCIPLINE.

About this time 1632, the Synod of Fife established a powerful social police under a rule

"That every parish be divided into several quarters, and each elder his own quarter, over which he is to have special inspection, and that every elder visit his quarter once every month at least."

They are to take notice of

"All disorderly walkers especially neglectors of God's worship in the Kirk and in their families, swearers, hunters of ale-houses, especially at unreasonable hours, and long sitters there and drinkers of healths,"

and all offenders in these particulars they are to delete to the Session. The elders of Culross, and the 'searchers' appointed for the town and the Valleyfield, seem to have acted vigorously, if we may judge by the number of offenders who are deleted to the Kirk-Session to be admonished or punished—

"12th August, 1632—Item—Callit Archd. Tailzeur with his wyf Margaret Swype, and accused for continued stryving and flying on the Lord's Day, with James Smith and his wyf Bessie Tailzeour, continued to the next meeting."

"26th August, 1632.—The quhilk day, Archibald Buckham with his wyf Margaret Ezatt and Cicil Brunston as also Archibald Tailyeour with his wyf Margaret Swype and James Sinclair with his wyf Bessie Tailyeour who all accused of scolding and flyting on the Lord's Day, could not deny. But the matter being cleared by Thomas Ezatt, butcher, that the men were not so in the fault as the women, therefore the men were gravelie admonished not to commit the lyk fault and were demitted. But the women were ordained to be brought to the Market Cross the next Saturday and to stand there for the space of one hour, for examples sake and for their scolding on the Lord's Day."

Cecile Brunston seems to have been an incorrigible scold, for on the 11th September, 1633,

"Quo die—Compeared Janet Wood, who accusit of flyting in time of divine service confessit that Cecile Brunston was the cause, who would not desist but still pursued her that she could not flie."

"Item—Called Cecile Brunston and accused of the same cryme could not deny, therefore they were both ordainit to be put in the *jougs* the next Saturday at the Market Cross quhilk was done."

"3d April, 1642—John Gibb, accused of dinging his wyf on the Sabbath Day, in his drunkenness, confessed his fault,

ordainit to mak his repentance publickly before the pulpit, and to stand between the second and third bell bareheaded at the kirk door, and to pay 12 shillings. Paid, satisfied, and withal enacted himself that if ever he be found hereafter to straike his wyf, in that case he shall sit at the Cross, with the branks, and stand barefooted at the Kirk door, and pay a dollar."

The punishment seems to have had a salutary and deterrent effect, for we hear no more of Mr John Gib.

"23d May, 1642—The kirk officer's wyf of Torriburn callet accused for selling of aill on the Sabbath Day, confessed her fault and promised amendment."

"David Don, accusit for making a brydol supper in time of afternoon service, confessit his fault and to pay 12 shillings."

"14th July, 1641—The session considering the great abuse of people's resorting to neighbour kirks and leaving of their own parish kirk, therefore thought meet to mak the following act. That who ever shall resort to other kirkes about, and leave their owne parishe kirk shall be delated and punished."

9th Augt., 1641.—Ane act was made for those who stand in the Kirkyard or Parly-hill discoursing and talking when God's Word is reading in the Kirk, shall be delated to the Session and punished accordingly, to pay 6 shillings. This Act to be intimat the next Sabbath, which was done."

"8th June, 1643.—Alexander Duthie enacted under pain of public repentance and paying a dollar, if ever he be found vaiging from the Kirk on the Lord's Day, as heretofore often he hath been found."

At a meeting of the Presbytery of Dunfermline held there on the 10th December, 1640, the

"Great abuses in tyme past in keeping of Yule day, by feasting, cessation from ordinary work in labour, and the spending the day in riotous playing and idle living,"

were taken into consideration, and it was ordained that

"All persons the said Yule day leave off their feasting and playing, and goe to their ordinary work, under all highest censure of the Kirk,"

and the elders are admonished to give good example to the rest of the congregation, and every minister of the Presbytery is to notify the same to their Sessions, and thereafter"

"The Sabbath following this decree is to be intimat and red publickly to the end that none pretend ignorance."

In the carrying out of this Presbyterial deliverance, we find that on the

"7th January, 1644, seven colliers from the Valleyfield were accused of keeping Yule Day in feasting and drinking and abstaining from their ordinary work, and having confessed their fault and made their repentance according to the order, payed every one of them 20 shillings."

WITCHCRAFT AND SORCERIE.

The most singular, however, of all the crimes which tarnished this age, and which has occasioned most

speculation, was that of "sorcerie or witchcraft," and the precautions taken against those who were charged with the offence, both before civil and ecclesiastical tribunals, exhibit a very strange picture of society. Witches were supposed to obtain possession of their supernatural powers by entering into a compact with the devil. They gave themselves up to him body and soul, and he engaged that they should want for nothing and that he would avenge them upon their enemies. As soon as the bargain was concluded the devil delivered to the witch an imp or familiar spirit, to be ready at a call, and to do whatever it was directed. By the assistance of this imp and the devil together the witch was enabled to transport herself in the air on a broomstick, to distant places to attend the meetings of the witches. They were also enabled to transform themselves into various shapes, particularly to assume the form of cats and hares, in which they most delighted; to inflict diseases on whomsoever they thought proper, and to punish their enemies in a variety of ways. It was not be expected that an extensive parish like Culross should escape the taint, although to its honour be it said there is in the "Extracts" no trace of the witch burnings and witch drownings, which disgrace the Kirk Session records of neighbouring parishes. The number of wretched women, however, who were brought before the Kirk Session on *suspicion* and gravely tried by the elders and by gentlemen heritors of the parish must have been very large.

"21st May, 1643—Because that some women of the land were taken suspect of witchcraft and sorcerie, the toune desyrt, that the gentlemen of the Land would be pleased to concur with them and to keep watch, as they should be advertised, and contribute for their necessity which they willingly undertook, and promised to discharge accordingly."

On the same day

"Edward Torshock and John Gray, were appointed to try concerning Marion Thomsone now in firmancie for witchcraft"

"The elders of Kincardine to try the next day against Elspet Shearer now in firmancie for witchcraft."

"On the 28th May, 1643, George Beveridge in Balgownie, John Aitkine, James Drysdale, James Wright, and David Russell to depone what they know concerning Marion Thomsone now in firmancie."

"On the 8th June, 1643, John Kynnard accused concerning Marjorie Burges delated for witchcraft, confessed that she had fled the toune and was gone to Stirling to her mother, and that he had her clothes and plenishing in the Castlehill. It was ordained that all the plenishing be arrested in his hand the next day, and he with other two whom the Baillis shall appoint to bring her back."

On the 9th of June, 1644, Andrew Clerk and his wife are brought before the Kirk Session for "seeking their daughter's health from Adam Donaldson," and having confessed their fault were ordered to make their repentance in public. On the 29th of June following, the aforesaid Adam Donaldson is cited, accused of "charming of horse and kine." He denied the accusation and the reporters thereof, to wit, David Sands of Birkenhead, John Bird, and John Sands, were summoned for examination the next day. On the 30th June, accordingly, the witnesses were examined, and *imprimis* John Bird deponed that Adam Donaldson said to him—

"He coft a cow at a tyme at Dunblane Fair, but she would give no milk, and purposing to tak hir back to the place where she cam from, by the way he met a woman who asked him where he was going—he answered as before. The woman said, "Good man, ye need not be so hastie, tak hir back again, and put a piece of rantle tree (rowan tree—a never failing charm against witchery) under her tail, and say thrice on your knees, 'Lord Jesus, send me milk,' which he did accordingly, and the cow gave milk in abundance before or since; and farther he confessed that ever since that time he had rantle tree under his knees."

John Bowey deponed the same. John Henderson, another witness, made still farther revelations. When examined, he deponed that he (Adam Donaldson)

"Baid him when he was to buy a cow lead her home himselfe, milk her himself, and drink the milk himself, and all the devils in hell should not have power over her. And if he were to buy a horse the first south running water he came to, to light off, with his horse's hinder feet in the water, and tak up a handful of sand out of the water, and three several tymes straik the horse back from his 'forret' to his shoulders, and then to his tail, and all evil spirits should not have power to wrong his horse by knee or thigh."

The superstitious belief that no diabolical power could pursue you over a running stream, prevailed long in Scotland. It was utilised by Burns more than a century later in his "Tam o' Shanter,"—

"A running stream ye daurna cross."

And in the course of the hearing of a case of assault, in the Inverness Court about a year ago, the extraordinary facts came out that belief in witchery and the practice of witchery has not even yet died out in the Highlands. An old woman residing in Inverness, was accused of having assaulted a young girl, grand-daughter of a neighbour with whom she was on terms of enmity. It appeared that the accused met the girl at the street pump and there twitted her about her grandmother being a witch, as she had made a *corps creich* or clay body for her with the object of doing her bodily injury. The girl retorted

in offensive language when she was assaulted by the old woman. A small clay figure was produced in court having its legs broken off, and stuck full of pins and sprigs, and the accused said she had found the figure in her window. It was also stated that she complained of losing the power of her legs, the legs of the image having been removed.

THE PLAGUE.

During the years 1439, 1514, 1529, 1584, and especially during the greater part of the year 1645, the plague raged with fearful violence in the towns on the North side of the Firth. On the first of July, 1645, appears the following entry :—

"The Session taking into consideration the great danger of infection of the plaige now spreading round about this paroche, have ordained that none toune ner land presume to receive any strangers under of present punishment and a pecuniall some to be exacted from them, and to have no benefit of kirk or market."

Notwithstanding all precautions, however, the pestilence spread, and between the 10th of August, 1645, and the 7th of January, 1646, the meetings of the Kirk Session were suspended, and the following ominous entry appears—

"During this intermissione the plaige was havie upon our toune."

Only two entries remain to be noticed, the first referring to the "Mortcloth" or pall belonging to the Kirk Session runs thus—

"14th March, 1646.—The minister shewed the Session that he was informed that the smiths had coft a new Mortcloth, and sent it through the toune and so prejudjed the kirk of the benefit they had of theirs, therefore the Session with ane consent ordains one act, to be made thus. That whoever heirafter shall mak use of the smiths' Mortcloth shall pay to the kirk the some that our Mortcloth is given up for."

The second gives some idea of the remuneration which a schoolmaster's assistant received in the 17th century.

"The Minister also desyred that some condition might be sattled for entertaining ane helper for the schoolmaster, because he was not able to bear the charge alone, and that once in the month or six weeks as occasion offered, every honest man in the toune who had bairns at the schule would aither give his day's meal or a grot, which they all thought very favourable and did consent thereto."

It is melancholy to think that a place of such commercial importance as Culross was in the 17th century, should in the century after the Union have sunk into decadence and decay. The first blow was struck by the Court of Session in 1727, when it found that no royal burgh could have a privilege such as the girdlesmiths enjoyed to the exclusion of

other royal burghs, and under the influence of this decision, the trade of girdle-making speedily ceased to exist. Towards the close of the eighteenth century extensive works for the extraction of naphtha and volatile salt from coal, were begun by Lord Dundonald, but this project also failed, and the place, deprived of all these sources of prosperity, has gradually dwindled into comparative insignificance. It is now an old-fashioned sequestered place, whose chief attractions are its beautiful surroundings and various architectural antiquities.

NOTES BY THE WAY—BIRDS.

(By Mr Gilbert Macdougall.)

At our last annual meeting committees were appointed to look after and report upon the various subjects for the study of which this Society was constituted. It fell to my lot, but without my consent, to be convener of as many *ologies* as the fingers of one hand can count. Your council have thereby conferred upon me a most onerous duty. Therefore, craving your usual indulgence for shortcomings on my part, I will in this paper proceed to notice what has been seen of the feathered tribes this winter in our immediate neighbourhood. The Missel Thrush—*Turdus viscivorus*—was not observed until the last week of January, since then an occasional bird has been seen and heard singing. I may here state that Thursday the 29th of January was the first day this season on which birds were heard to tune their throats to any extent. On February the 5th were seen the first Fieldfares—*Turdus pilaris*—14 in number, flying from east to west over Laurelhill Park. The Song-Thrush or Mavis—*Turdus musicus*—is still somewhat scarce. Half-a-dozen or so of them were seen along with some Blackbirds about the middle of January in search of food among leaves which have accumulated upon various parts of the bank above the Smith Institute. In several other places one or two have occasionally been seen, but they are by no means plentiful, for the long continued storm in the winter of 1880 and 81 nearly annihilated them; only one pair was known to nest in the Abbey Craig in 1881. The Blackbird—*Turdus merula*—is hardier than the Thrush and therefore more plentiful; he also is bolder in quest of food when necessity compels him. The Ring-Ouzel or Mountain Blackbird—*Turdus torquatus*—has a white ring round its neck, by which it receives the name of Ring-Ouzel. It is

seldom found upon the plain, its abode being the hillside or mountain glen. The Common Dipper or Water-Ouzel—*Cinclus aquaticus*—is a well-known bird to anglers, its black plumage and white breast makes it a conspicuous object when seen sitting upon a stone in the middle or side of a stream. Who among us is not familiar with the Robin—*Erithacus rubecula*—who generally at the approach of winter comes near the abode of man, there to remain a guest until the returning sun raises within him an ardent glow as warm as the appearance of his breast. The Hedge-Sparrow—*Accentor modularis*—is well known, though never very abundant. No schoolboy but knows a Bussack's nest by its five blue eggs. The Great Titmouse—*Parus major*—and the Blue Titmouse—*Parus cæruleus*—are to be seen hopping about the hedgerows or tree tops. They are lively little gentlemen, ever on the move in search of something to sustain life. About two years ago a flock of Blue Tits had an insect hunt in the hedge in front of my house; in their general movements they much resembled the Long Tailed Titmouse—*Acredula caudata*—but they made a more minute search for insects than that bird would do. The Common or Cutty Wren, *Troglodytes familiaris*, as its specific name implies, is familiar to us all. . How is it so seldom seen hopping about roots of hedges and overhanging banks when the females lay so many eggs? The Wagtails are seldom seen in mid-winter, they prefer warmer climes and sunnier skies. One, the Pied Wagtail—*Motacilla lugubris*—was seen in the vicinity of my house on the 15th of January, it remained but a short time when it took its flight Stirling-ward, since then I have seen it once or twice. The Meadow-Pipit—*Anthusa-pratensis*—is the Moss-Cheeper of my boyish days. He frequents the moorlands where he is often seen following in the wake of the Cuckoo. The Green-finch or Green-Linnet—*Ligurinus chloris*—and the Chaffinch Fink or Shilfa—*Fringilla cœlebs*—are found at this season congregated together about stack yards. A few of the Bramblings, Cock of the North or Mountain Finch—*Fringilla monti-fringilla*—may also be seen in their company. This appears to be a very timid bird, flying away before you get near it. The Common Sparrow—*Passer domesticus*—everybody knows, and some of you, I daresay, are wishing they were not so plentiful, because your crops of gooseberries, currants, and peas would be more abundant than they some-

times are. But the sparrow is not guilty of all that is laid to its charge. A certain gentleman in Stirling had one summer, not long ago, a young girl assisting his servant who occasionally paid a visit to the gooseberries. Each morning after the gentleman returned from his walk in the garden, when passing the girl he would say to her "The Speogs" meaning the sparrows "are at the gooseberries." The girl was delighted to think that the sparrows were accused for her depredations and could not see the force of his words until told by her fellow servant that she was the sparrow meant. The Tree Sparrow—*Passer montanus*—is not nearly so numerous as the House Sparrow to which it bears a striking resemblance, the male has more white feathers about the head than that bird. The Linnet—*Linota cannabina*—is admired for its sweet song, sweeter and more pleasant by far to the ear than the song of the canary which is so much prized. The Lesser Redpole—*Linota rufescens*—is a bird easily taught several antic tricks. The Twite or Heather Linnet—*Linota flavirostris*—has not much of a song. The male is easily distinguished by a few red feathers which cover the quills of his tail feathers. The Common Bullfinch—*Pyrrhulla europœa*—is a beautifully plumaged bird with his black head and crimson breast. He is generally found in or near woods; one of his favourite foods being the buds of the sloe. The Yellow Bunting—*Emberiza citrinella*—often called the Scotch Canary, but best known by the name of the Yellow Yite or Yellow Hammer is common. The Reed-Bunting—*Emberiza schœniclus*—is by no means a very common bird. In winter it leaves its summer retreat—moorland and waste places—for a more stirring abode, the farm yard. Except the head of the male, this bird in colour is very much like a sparrow. The Sky-Lark—*Alauda arvensis*—is greatly prized for his song, and justly too. At no other time can I listen to his music with so much admiration as I do to his morning song of praise as he mounts sky-wards with the dew spangles still on his breast, before day has dawned and all around in peaceful slumber lies, no other voice being heard, if on the moorland. The Common Starling—*Sturnus vulgaris*—has been accused of eating Lark's eggs. Any bird that will eat a lark's egg will eat those of any other bird they may find. I have no belief in the egg-eating propensity of the Starling, The Common Jay—*Garrulus glandarius*—is to be found sparsely about Blair Drummond as is also the

Magpie—*Pica rustica*. The last Magpie I saw was at Bridge of Allan two years ago but it appeared to be a pet. The Jackdaw—*Corvus monedula* and the Rook commonly called Crow—*Corvus frugilegus*—are both well known and often seen birds, but the Carrion or Hoody—Crow—*Corvus corone*—is not so common. This Crow like the Raven—*Corvus corax*—is a bird of prey. The Barn Owl—*Strix flammea*—is the well known Hoolet or Screech Owl. The Long-eared Owl—*Asio otus*—the Short-eared Owl—*Asio accipitrinus*—and the Tawny Owl—*Syrnium aluca*—are denizens of our darkest woods and highest cliffs and are seldom seen, for like evil-doers they love the darkness. The Sparrow Hawk—*Accipiter nisus*—the Common Kestril—*Falco tinnunculus*—and the Merlin—*Falco æsalon*—are seldom seen, being shot wherever found by would-be sportsmen. To the Hen-harrier or Blue-hawk, the Glede and Peregine Falcon I am afraid we will have to bid good-bye. Of the two former, I have not seen a live specimen for more than 30 years, whereas of the latter, the last seen in the district that I have any account of, was shot about three years ago somewhere about the head of Menstry Glen on the Tullibody estate. Of the Common Heron—*Ardea cinerea*—a few specimens are occasionally seen flying to and fro. Several species of Wild Geese are often seen passing overhead, but the most common one is the Bean-Goose—*Anser segetum*. The Mallard or Wild Duck—*Anas boscas*—frequents solitary spots on both the Forth and the Teith. A Common Teal—*Querquedula crecca*—was shot at Ochtertyre a short time ago. *Columba palumbus*—the Ring-Dove or Cushat, farmers think is too abundant. Where so plentiful, that several hundreds are to be seen feeding in one field in spring or autumn they do an incalculable amount of damage. So long as there are preserving Game Laws, the Pheasant—*Phasianus colchicus*—the Partridge—*Perdix cinerea*—the Red Grouse or Moorfowl—*Lagopus scoticus*—and the Black Grouse or Black Game—*Tetrao tetrix*—will be well cared for. The Capercaillie—*Tetrao urogalus*—was once exterminated from Britain. It surely was not for the delicacy of the flesh of the old bird it was so much hunted down, unless the taste of spruce tops was considered a delicacy in those days. The Moorhen or Waterhen—*Gallinula chloropus*—is easily known from the Common Coot—*Fueica atra*—by the red mark upon the forehead, whereas the Coot has a white stripe. Only a few Golden Plovers—*Chara-*

drius pluvalis—have been observed, but the Lapwing—*Vanellus vulgaris*—is very plentiful and flies about in large flocks. Some winters they leave us for a time, but not so this one, for every day I have been at home a few were seen flying about. The Woodcock—*Scolopax rusticula*—is seldom to be seen in the daytime unless disturbed. But when the day is drawing to a close and the shades of evening are fast descending, it ventures from its hiding place, and by those who know its cry, it is then easily observed flying overhead as it goes from one retreat to another. The Common Snipe—*Gallinago cœlestis*—and the Jack Snipe—*Gallinago gallinula*—make their home by the side of water courses or in marshes. The Common Curlew — *Numenius arquata* — is seldom with us in winter, but casual birds may occasionally be seen passing. Of the Gull family a goodly number visit us, if stormy about the coast. A few of them are the Common Gull—*Larus canus*—the Herring Gull—*Larus argentatus*—the Yellow-legged Herring Gull—*Larus leucophœus*—the Great Black-backed Gull—*Larus marinus*—and the Glaucous Gull—*Larus glaucus*. I caught a specimen of the last mentioned gull this winter which measured 4 ft. 4 in. from tip to tip of wings. Birds are like flowers, various authors—various names, but in these notes I have followed those used by H. E. Dresser, F.L.S. &c., in his European birds. If any birds not mentioned here are observed by any member, would they be kind enough to take note of them and hand them to me that the ornithology of the district may be satisfactorily wrought up.

The annual meeting of the Stirling Natural History and Archæological Society, was held in the Smith Institute on Tuesday, 2d October—Rev. Mr Goldie in the chair. There was a large attendance of members. The minutes of former meeting having been read and approved by the meeting, Mr Chrystal, secretary, read the annual report. The following interesting specimens were laid on the table for exhibition, and were very much admired :—A stone axe or war club, as originally mounted, being part of a set of war implements, and a complete war dress of the natives of New Guinea, presently recently to the Smith Institute by Mrs J. Burns of Demerara, now on a short visit to Stirling; also a beautiful and valuable specimen of gold ore in felspar, sent on loan to the Institute by Mrs Burns—the specimen was exhibited at the Sydney Exhibition and awarded a Certificate of Merit; an excel-

lent specimen of the badger, taken last season on the Leckie estate, and kindly presented to the Institute by Mr M'Clure, gamekeeper, Leckie. The following specimens were exhibited by Mr Sword :—Nest of the Common Wren, and a nest of the Dipper, with another showing the interior structure of the nest; two nests of the Spotted Flycatcher, found on a wooden shelf in an open and disused outhouse near Stirling; the nests were shown on the shelf exactly as found, the press of boarding on which they were built having been sawn out, and are placed so close as to touch each other. The same pair of birds hatched and reared a brood in each nest during the present year, the second nest being built while the first brood was being reared; a third nest was begun to be built close to the second nest, while the brood in the second was being hatched, but it was not far proceeded with. Mounted specimens of the Buzzard, Whimbrel, Wheatear, Willow Warbler, and Ledge Warbler, were shown, and are added to the local collection. The usual votes of thanks terminated the proceedings.

STIRLING NATURAL HISTORY AND ARCHÆOLOGICAL SOCIETY.

TREASURER'S FINANCIAL STATEMENT FOR YEAR ENDING 6th OCTOBER, 1885.

CHARGE.

Balance from last Account,	£1	10	1½
Subscriptions received during year,	9	19	0
Donation do.,	0	10	11
"Transactions" sold,	0	13	3
Interest on Bank Account,	0	1	2
	£12	14	5½

DISCHARGE.

Paid Rent of Lesser Public Hall for Mr Lumsden's Lecture,	£0	15	0
Paid Cook's *Fresh Water Algæ*,	0	7	6
Paid for Stationery,	0	10	0
Secretary's Postages,	0	10	0
Stirling Journal for Advertising and Printing,	3	10	11
Do. for Printing "Transactions,"	3	0	0
Stirling Observer for Printing and Advertising,	0	17	0
Fire, Gas, and use of Museum Room,	1	10	0
Cleaning, Lighting, and Arranging Room for Meetings,	1	0	0
Balance in Treasurer's hands,	0	14	0½
	£12	14	5½

TRANSACTIONS

OF THE

STIRLING NATURAL HISTORY

AND

ARCHÆOLOGICAL SOCIETY.

1885-86.

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1887.

CONTENTS.

NOV. MEETING.

Notes on Fossil Spores from the Coal Measures, Kelly Burn, Perthshire, by Mr Robert Kidston, F.G.S., ... 1

DEC. MEETING.

Fungi, by Rev. J. M. Robertson, St. Ninians, ... 9

FEB. MEETING.

Iona and its Sculptured Stones, by Miss M'Lagan, Ravenscroft, ... 15

MARCH MEETING.

Tumuli at Craigengelt, by Mr A. F. Hutchison, M.A., ... 27

Notes on the Pairing of Birds, by Mr Gilbert M'Dougall, ... 28

APRIL MEETING.

Colonel Edmond: a Son of the Rock in the 16th Century, by Mrs Jane D. Hogg, ... 29

MAY MEETING.

The Redwing, by Mr David Bruce, Victoria Place, ... 44

The Geology of the Castle Rock, by Mr Alex. Moyes, Park Terrace, ... 47

JUNE MEETING.

Ancient Brocks in the Neighbourhood of Stirling, by Miss M'Lagan, Ravenscroft, 50

The Mammet King, by Rev. J. E. H. Thomson, ... 57

Gall Producing Insects, by Mr Gilbert M'Dougall, ... 70

SEPT. MEETING.

The Old Burgh Laws of Scotland, by Rev. Mr Goldie, ... 75

OCT. MEETING.

Secretary's Report, ... 89

Treasurer's Report, ... 89

President's Address, ... 90

STIRLING NATURAL HISTORY AND ARCHÆOLOGICAL SOCIETY.

The monthly meeting of the Stirling Natural History and Archæological Society was held in the Smith Institute on Tuesday evening, 3d Nov., 1885—Dr Galbraith presiding in the unavoidable absence of the president, Rev. Mr Goldie, through indisposition. There was a good attendance. Mr Robert Kidston, F.G.S., read a very interesting paper entitled "Notes on Fossil Spores from the Coal Measures, Kelly Burn, Perthshire." At the close the Chairman invited questions or remarks, and stated that the Society were greatly indebted to Mr Kidston for the papers which he was good enough to read before them from time to time. They embodied the results of his own investigations, and they had therefore a distinct and permanent scientific value. Mr Moyes moved a vote of thanks to Mr Kidston, which was heartily accorded. The lecture was illustrated by beautifully prepared diagrams, by specimens of the fossil plants of the coal measures, and by spores of lycopods and selaginella, shown under the microscope. Mr Kidston thanked the gentlemen—Mr Sword, Mr Gentleman, and Dr Rae, who had kindly assisted him in arranging specimens for exhibition, and had lent their microscopes for the occasion. This concluded the business.

NOTES ON FOSSIL SPORES FROM THE COAL MEASURES, KELLY BURN, PERTHSHIRE.

By Mr Robert Kidston, F.G.S.

Spores subserve the same purpose to the Cryptogamic or Flowerless Plants that seeds do to the Phanerogamic or Flowering Plants, namely, the reproduction of the species. Seeds are of very complex structure and contain an embryo or young plant. Spores on the other hand are usually little globular or elliptical bodies, though they occasionally assume other forms, consisting of a single cell, generally enveloped by a

wall composed of two coats, the outer or *exosporium* being often ornamented with spines or ridges, has a great variety of surface ornamentation, which causes them to form beautiful objects for the microscope. Many plants, as Ferns, Lycopods, &c., develope their spores by free cell formation, in others, as in Algæ and Mosses, the spores result from a sexual process—hence the word *spore* in its fullest sense has a very wide application. The spores brought before you this evening are all Lycopodiaceous, and therefore developed by free cell formation. In the *Lycopodiacæ* are included several well marked genera and of these three are British—*Lycopodium, Selaginella, and Isoetis.* They are all found in this neighbourhood, the two former are terrestrial, the last mentioned, terrestrial or aquatic, but only the aquatic species are found in Scotland. In *Lycopodium* the spores are of one kind and are borne in *sporangia* situated at the base of the stem leaves or in terminal cones. In *Selaginella* the spores are of two kinds—*microspores* and *macrospores* borne in terminal cones. The macrospores, almost invariably four in number, enclosed in a sporangia, are usually situated in the lower part of the cone; the microspores, generally very numerous, occupy sporangia on the bracts of its upper portion. In all these cases the spores are developed in groups of four, having at their upper surface, where the four spores press upon each other, a triradiate ridge, at which part the spore splits in germination for the protrusion of the young plant (called the *prothallium*) which arises from the spore. The development of *Lycopodium* is but imperfectly understood. In *Selaginella* the *microspores* (or small spores) produce the male organs *(antherida)* and the *macrospores* (or large spores) the female *(archegonia)*, the fertilization of the latter producing a plant similar to that which bore the spore. There is here an example of that mode of reproduction which has been distinguished as "alternation of generation"—that is to say, between the parent Lycopod and the young seedling Lycopod, there is interposed a growth —the *prothallium*—which in form and structure differs much from the plant that gave it birth, but which is designed to bear the male and female organs by which the parent species is perpetuated. The occurrence of spores in coal has been familiar to botanists for many years. In 1833, Witham, while describing the microscopic structure of coal to prove its vegetable origin, figures in his now classic work on the "Internal Structure of Fossil Vegetables found in the Carboniferous and Oolitic Deposits of Great Britain," several sections of coals from different localities. On pl. xi., fig. 4-5, is given a transverse and longitudinal section of "some species of Cannel Coal from Lancashire," where Mr Witham says, "I have certainly found decided traces of organization." (l. c., p. 50.) "The appearances, however, are so undecided, that, although I should be inclined to consider them indicative of a Monocotyle-

donous plant, I shall not venture upon any conjecture respecting them." What Mr Witham here mistakes for the vessels of a monocotyledonous wood, are numerous spores. This is as far as I am aware, the first figure or note of the occurrence of spores in the fossil condition, though Mr Witham at the time mistook their true nature. Notwithstanding the interest of this field of investigation thus opened up, little seems to have been done in the microscopical study of coal plants for some years afterwards. In Silliman's Journal for Nov., 1847, Mr S. E. Teschemacher calls attention to his discovery of small seeds, with apparently-spinous appendages, in coal, but his descripton of them is too insufficient to decide whether his small fossils are spores or really small seeds allied to *Cardiocanpus*. Of late years many allusions have been made to the occurrence of spores (usually erroneously called *sporangia*) in coal, and at one time a very warm discussion took place, as to the share they took in its formation, but in all these cases, they were only examined as feund in the coal by sections of it being cut and prepared as transparent objects for microscopical examination. By this means only a very imperfect knowledge of the form and varieties of the individual spores was arrived at, and even when examined as opaque objects on clean fractured surfaces of the coal containing them, there is only obtained a very imperfect idea of their structure, hence the discovery of a means by which spores could be isolated from the matrix and examined by the microscope individually, at once gave fuller opportunity for their examination, resulting in the discovery of many different kinds and varieties of spores from the carboniferous formation alone. It may be interesting here to mention the circumstances that led to the discovery of a very simple means by which these minute fossils can easily be isolated for microscopical examination. This discovery is due to Mr James Bennie, one of the staff of the Geological Survey of Scotland. So far back as 1869, while washing some brick clay from Abercorn clayfield, Portobello, with the object of ascertaining, if it was as rich in *Foraminifera* as the glacial clays of Paisley and Glasgow, he found in a layer of sand, lying between two beds of clay, about 14 feat below the present surface, a number of small spores; these he subsequently recognised as similar to spores that form a band in the splint coal worked at Whitehill Colliery, near Rosewell, Midlothian—the identification of the Portobello spores with those occurring in the coal at Whitehill was, however, only made in 1883, when Mr Bennie discovered that he could isolate the spores from their matrix and, like many other discoveries, it was found out accidentally. Having heard from Mr Kirkby, Windygates, Fife, of there being great numbers of small organisms in the first two inches of shale above the " Encrinite Bed " at Pittenwesm, he visited that locality to collect some specimens

of the shale, and as the coal on which the shale lay was much weathered, portions of it adhered to the shale. These specimens were thoroughly dried and subsequent steeping or boiling in water reduced them to a mud, which, when washed, left a fine sediment behind. While examining the residue thus obtained, it was discovered that it contained numerous spores in a fine state of preservation. This led to the collection of a number of samples of such material from different localities, which almost always were found to contain spores. It is perhaps best that I quote a paragraph from a letter from Mr Bennie, which gives the general results of his investigations in this branch of fossil botany :—

"Following up the clue thus by circumstances placed in my hands, I tried all the likely fireclays and coals exposed in the cutting of the New Edinburgh Suburban Railway, Niddrie, (Millstone Grit) and found spores in all of them in a lesser or greater degree. I next tried coals and shales of the same rocks by the shore at Joppa with a like result, then the coals and shales of the same period on the opposite Fife coast at Dysart, with similar results. Next the poor coals and shales of the Calciferous Sandstones, below the Carboniferous Limestone Series and the richer coals and shales of the coal measures, and though not finding spores universally in all, yet in so many that I can say that almost all coals, shales and many plant beds have free spores embedded in them in such a way that they can be separated from the matrix by the simple methods of artificial weathering and washing."

The question that next suggests itself to one's mind is :—What fossil plants were likely to produce these spores? Now, it is known that nearly all the Carboniferous Plants were Cryptogamic, probably the only exceptions being those large stems, some of which were so fully described by Witham many years ago, and which were referred to the Coniferæ, though more recent investigation has shown that some, if not all of these trees, may be more appropriately referred to the Cycadaceæ, a group of plants closely allied by many of its structural characters to the Coniferæ. Cryptogamic plants appear to have attained their maximum degree of development during the Carboniferous period, and of these, two genera at least, *Lepidodendron* and *Sigillaria*, are now known to have produced spores very similar to those from Kelly Burn. The plants of both these genera attained to great dimensions, the *Lepidodendra* reaching the height of 100 feet, with a basal circumference of 12 feet. The *Sigillariæ*, also attained to arborescent dimensions, stems having been found with a circumference of 15 feet. Recent Lycopods are of small size, seldom exceeding 2 or 3 feet in height. The stems of *Lepodedendron* are covered with lozenge-shaped leaf-scars, which are either placed in close contiguity or separated from each other by a greater or less interval. The leaves were lanceolate or long and grass-like. Their fruit was borne in cones, either at the ends of the young branches or placed on

two opposite rows on the older stems. The lower scales or bracts of these cones bore *macrospores*, and the upper *microspores*, in a similar manner to what obtains in the little cones of *Selaginella*. In *Sigillaria* the stems are either smooth or furrowed; the leaf scars on the smooth barked individuals are contiguous or distant; in the furrowed species they are placed on the ribs either closely together in vertical rows, or more or less distant from each other. These also produced cones, but they are a much rarer fossil than those of *Lepidodendron*, and it was not till the middle of 1884 that it was affirmatively known that *Sigillaria* bore cones, when M. Zeiller announced the discovery of specimens showing them attached to stems bearing the characteristic leaf scars of the genus. Till then the Lycopodiaceous nature of Sigillaria had been doubted by many foreign botanists. (Ann. d. Sciene. nat. 6 sér. Bot., vol. xix., p. 256. Pls., xi.-xii.) It will thus be seen that *Lepidodendron* and *Sigillaria* have many characters in common, but they are easily distinguished from each other by the structure of the leaf-scar and the vascular impressions, but it is here unnecessary to enter more fully into these distinctions. (See Annals and Mag. Nat. Hist., vol. xvi., pp. 173-4, 1885.) As far back as 1840, Prof. Morris (Trans. Geol. Soc., Lond., 2 Ser., vol. v., Pl. xxxviii.), described a *Lepidodendron* cone in which the spores were seen; these were mamillate and similar to some shown this evening. Among the Sigillarian spores are some with smooth exterior, and some whose outer surface is also mamillate. These were first figured by Goldenberg in 1855 (*Flora sarœpontana fossilis*, Pls. B. fig 18-25; IV, fig. 3; X. fig. 1-2), but more fully by Zeiller in 1884, as already mentioned. Several Generic names have been applied to fossil spores. In 1868 Sir John Wm. Dawson described two species in his Acadian Geology under the name of *Sporangites*, his two species being *S. papillata* and *S. glabra*. Professor Williamson has also figured and described some very interesting forms under the names of "Macrospores," *Traquaria*, *Zygosporites* (see his *Memoirs* on the Organization of Fossil Plants from the Coal Measures; Phil. Traus, part ix., 1878; part x., 1880; part xii., 1883); but with our present amount of knowledge of these reproductive bodies, a satisfactory classification is impossible, most of them probably being the spores of plants with which we are familiar in other conditions. Dr Renisch, in a valuable and interesting work on this subject, where he illustrates some hundreds of spores, proposes to include under the name of *Triletes* all those which are provided with a triradiate ridge. This arrangement is altogether provisional, but for the sake of convenience is adopted here (see *Reinsch. Micro-Paleo-Phytologia Formationis Carboniferœ, vols. i., ii.: Erlangen*, 1884). From characters derived from the marking on the outer surface of the spore, they can be conveniently placed in the following minor groups:—*Triletes—(a.)*

Outer surface smooth. This is a common form, and is probably referable to *Sigillaria*, as some very similar spores have been described as occurring in the cones of that genus. *(b)* Outer surface covered with *papillæ*. Of spores whose surface is covered with *papillæ*, several marked forms occur. On one, the papillæ are numerous, and about four times their breadth in length. The second form has larger and broader papillæ. The third and fourth varieties have very short pyramidal spines, and differ chiefly from each other in the size of the spores. In all these, the surface on which the triradiate ridge occurs has the papillæ much smaller, except at the periphery, where they are of normal size, but decrease as we approach the triradiate ridge, in which neighbourhood they appear as little dots. *(c.)* Outer surface covered with bristles. This form is rare. The whole of the non-triradiate surface is covered with irregularly scattered bristle-like hairs. *(d.)* Body of spore smooth, but surrounded by an equatorial band of appendages. Two distinct forms of these spores are found at Kelly Bank. The first has the equatorial band formed of flattened hair-like appendages, which are occasionally bifid and trifid at their extremities. When viewed by transmitted light, the appendages have a beautiful amber colour. The second variety has a solid equatorial band, which in structure appears as if composed of a number of hair-like segments, which had become confluent. These last two varieties are not uncommon. These macrospores average from 1·80 mm. to 1·30 mm. in diameter, but little variation in size takes place among the individuals of a given species. In addition to the above, several other small organisms were collected, including *microspores*, which are perhaps Lycopodiaceous, and some small spores which may belong to ferns. To these must be added some nondescript individuals, whose true nature we have not yet succeeded in deciphering. Before concluding this subject, we must briefly refer to the economic value of spores. The spores of recent Lycopods are of little value, but from their highly inflammable nature, a quality arising from the great porportion of resinous matter which enters into their composition, they were formerly used for producing lightning in theatrical performances, but electricity has in great measure superseded them for such a purpose. They were also used to roll pills in, as their resinous composition was not easily wetted by the saliva, and so prevented the nauseous flavour of the drug from reaching the sensitive papillæ of the tongue. To fossil spores, however, a much higher place must be assigned. Professor Huxley, in his paper "On the Formation of Coal," published in the *Contemporary Review* of 1870, ascribes to them a place of the first importance in the formation of coal, and though some coals are composed in great part of spores, still such occurences are the exception, not the rule. That this is so has been shown by Sir John W. Dawson in his memoir "On Spore

Cases in Coal" (Annals and Mag. Nat. Hist., vol. vii. p. 321, 1871), which may be regarded as a reply to the conclusions arrived at by Professor Huxley. From my own experience, when spores occur in any great quantity in coal, they are usually restricted to narrow bands, an inch or an inch or two in thickness, and though some spores may probably be distributed throughout the entire coal seam, still the proportion taken by them in the formation of coal generally, (excepting the bands already referred to), seems very small when compared with the other vegetable remains which enter into its composition. Such spore bands are, however, very common and a good example is seen in the coal worked at Tullygarth Pit, Clackmannan, yet, even limiting the distribution of spores to such bands, they must contribute a considerable quantity of valuable coal, but, notwithstanding the part they here play and even if some be distributed throughout the whole seam, they probably form, proportionally, only a small quantity of the whole coal contained in the various British coal fields. The occurrence of spores in bands is quite accounted for by a not uncommon phenomenon in the neighbourhood of large pine forests, where, under certain conditions, when the pollen is ripe, it is shed in such quantities that the ground is completely covered with the yellow grains. Such falls of pollen have frequently been referred to under the name of "Sulphur Showers." It has often been remarked and even in a complaining tone, that of the quantity of seeds or spores produced, very few ever fulfil their mission by developing into plants, but one should remember that the reproduction of their kind is not the only end of their creation. In elucidation of this, I cannot do better than give an extract from the paper by Prof, Huxley "On the Formation of Coal":—

"Finally, yet another curious consideration. Let us suppose that one of the stupid, salamander-like Labyrinthodonts, which pottered, with much belly and little leg, like Falstaff in his old age, among the coal forests, could have had thinking power enough in his small brain to reflect upon the showers of spores which kept on falling through years and centuries, while perhaps not one in ten million fulfilled its apparent purpose, and reproduced the organism which gave it birth, surely he might have been excused for moralizing upon the thoughtless and wanton extravagance which Nature displayed in her operations. But we have the advantage over our shovel-headed predecessor—or possibly ancestor—and can perceive that a certain vein of thrift runs through this appparent prodigality. Nature is never in a hurry, and seems to have had always before her eyes the adage, "Keep a thing long enough and you will find a use for it." She has kept her beds of coal many millons of years without being able to find much use for them; she has sent them down beneath the sea and the seabeasts could make nothing of them; she has raised them up into dry land, and laid the black veins bare, and still, for ages and ages, there was no living thing on the face of the earth that could see any sort of value in them; and it was only the other day, so to speak, that she turned a new creature out of her

workshop, who by degrees acquired sufficient wits to make a fire, and then to discover that the black rock would burn. I suppose that nineteen hundred years ago, when Julius Cæsur was good enough to deal with Britain as we have dealt with New Zealand, the primœval Briton, blue with cold and woad, may have known that the strange black stone of which he found lumps here and there in his wanderings, would burn, and so help to warm his body and cook his food. Saxon, Dane, and Norman swarmed into the land. The English people grew into a powerful nation, and nature still waited for a full return for the capital she had invested in the ancient club-mosses. The eighteenth century arrived, and with it James Watt. The brain of that man was the spore out of which was developed the steam engine, and all the prodigious trees and branches of modern industry which have grown out of this. But coal is as much an essential condition of this growth and development as carbonic acid is for that of a club-moss. Wanting coal, we could not have smelted the iron needed to make our engines, nor have worked our engines when we got them. But take away the engines and the great towns of Yorkshire and Lanarkshire vanish like a dream. Manufactures give place to agriculture and pasture, and not ten men can live where now ten thousand are amply supported."

It is but fifteen years since the paragraphs just quoted were penned, and is there not now a rival in the midst of us, electricity, which is eagerly contesting the claims of coal, both as a motive and illuminating power?

The monthly meeting was held in the Smith Institute on Tuesday evening, 1st Dec.—the Rev. Mr Goldie presiding. There was a very satisfactory attendance. The rev. Chairman in appropriate terms introduced the Rev. J. M. Robertson, minister of St Ninians, who read a paper on "Microscopic Fungi." Mr Robertson is an acknowledged authority on this subject, and his remarks, based on personal investigations, have therefore a high scientific value. Mr Robertson also offered further papers on the Fungi, as well as aid to members of the society who might wish to prosecute the study for themselves. The lecture was illustrated by beautiful hand-painted diagrams, kindly lent by Professor Dickson and Mr M'Alpine, Minto House, Edinburgh. Specimens of Bacilli were also exhibited under the microscope. At the close, a very hearty vote of thanks was, on the motion of Mr R. S. Shearer, conveyed to Mr Robertson by the Chairman. This concluded the business.

FUNGI.

By the Rev. J. M. Robertson, St Ninians.

In contradistinction to the flowering plants or Phanerogams Linnaeus included under his twenty-fourth class, a great group which he named Cryptogamia, and which he regarded as merely a subsidiary department of the Vegetable Kingdom. His artificial system being founded solely on the number aad mode of arrangement of the sexual organs did not classify plants according to their fundamental relationships, and hence the distinctions separating classes so widely apart as, for example, the Lycopods and the Algae were left comparatively unnoticed by the method he pursued. The term he adopted, however, is still employed, and justly, to indicate flowerless plants, and although we know that fungi, mosses, and ferns, are far less allied to each other than any of the 23 classes which composed the Phanerogamous division we are in the habit of ranking them together in the common category of Cayptogams. The fungi are comprised in a group of cryptogamous plants which is now generally known by the name of Thallophytes, and are characterised as plants of very simple structure, without any true differentiation of leaf and stem. It is not quite correct at the same time to treat them as if the stem were entirely absent. Professor Sachs, whose classification of the Thallophytes is adopted by Dr Vines in his Elementary Text Book of Botany, distinctly says in his later lectures on Vegetable Physiology,

that the distinction between the mycelium and the fruit-bearers in the higher fungi, means nothing else than the distinction between root and stem, only that the stem is destitute of organs of assimilation. Nor is it by any means accurate to say that there is no sexual reproduction evident among the fungi. It occurs in the case of a very large number of plants belonging to the class, although the mode of reproduction is never so apparent as in the phanerogams, and the product of sexual union is always a spore or mass of spores instead of seed with an embryo. In short it is very difficult to frame an exact definition of the fungi, since with one exception they resemble at one point or other those contiguous forms from which a correct definition should mark them off. That exception, however, is a very important one and must be mentioned before I proceed further, because it presents a peculiarity with which the structure of fungi and their mode of growth are intimately correlated. In all other plants we find the presence of Chlorophyll, a green-colouring substance which is easily extracted by steeping fresh leaves in warm alcohol for a short time. This Chlorophyll colours green, certain corpuscles or small granules of protoplasm situated for the most part in the leaves. These again, whether by virtue of the Chlorophyll or their inherent powers, discharge the very important function of forming starch under the influence of sunlight, out of the Carbon dioxide inhaled by the foliage and the water absorbed by the roots. Starch grains are produced often in large quantities by the Chlorophyll corpuscles. They furnish material for the formation of the cell walls, the chemical constitution of which is represented by the same formula (C_6 H_{10} O_5.) Thus the physiology of respiration in every other class of plants except the fungi embraces, 1st, the absorption of Carbon dioxide either from the atmosphere or water holding it in solution, 2d, union of its elements with the elements of water previously absorbed by the roots, in other words the formation of starch, 3d, the removal of the starch so formed to other parts of the plant in order to build up as cellulose the cell walls, and 4th, the expiration of the superfluous oxygen. Now this process of assimilation, as it is called, is one to which the fungi are utter strangers. They are unprovided with Chlorophyll and are consequently unable to decompose carbonic acid and to construct out of its elements the organic compounds which form the tissues of other plants. Hence they live for the most part on the decompos-

ing remains of organisms which have already done the metabolism for them, and may grow in the dark. Hence, too, you can always distinguish a fungus from an alga, by the fact that the latter shows the green colour of its Chlorophyll, while the former is either not green at all, or when green is so because of some indifferent pigment of no physiological importance whatever. Only a few flowering parasites, such as the dodder and lathrea, present the same peculiarity of being destitute of chlorophyll and of obtaining the products of assimilation ready made from their neighbours. With regard to the reproduction of fungi, it may take place in one of three ways. First, in the lowest order, the Schizomycetes, to which belong the Bacteria and Bacilli, so well known from the part they play as disease germs, reproduction is effected by cell divisions. In the other orders it is brought about, secondly, by means of conidia without conjugation or asexually; and, thirdly, by means of zygospores, or spores fructified through the union of the sexes. In the numerous and conspicuous order of the Basidiomycetes, including all those fungi which are known as mushrooms and toadstools, no sexual organs have yet been discovered, and their spores must therefore be regarded as simple conidia. We must remember at the same time that the subject is a very obscure one, and from certain circumstances which have become known to observers (for instance, the connection between the common edible mushroom and the horse) it is far from improbable that under conditions of which we are still ignorant the larger fungi are fertilised through sexual union. But what is of the utmost interest in connection with the life-history of fungi is a feature of their reproductive processes which they share in common with the ferns and mosses—I refer to the so-called alternation of generations. Many of you must have seen a gardener propagating ferns. He lays a fertile leaf, let us say of the true maiden-hair, on moist soil, the sori or spores undermost. The spore to which he will be indebted for the future plant expands into a broad surface, bearing male and female organs. Thus, you perceive, there are two generations, one producing sexual organs, the second asexual organs, which again gave rise to the sexual, and so on, each full grown fern representing a cycle or two. In the case of the fungi, the alternations are, so far as they are known, more numerous, while they are always less evident than with the ferns. The lecturer then referred to the rust of wheat, and

illustrated its supposed cycle of five generations by diagrams. He continued—If I may be allowed to point a moral or two from this unadorned tale of fungoid variations, it would be in the first place—Never despise popular beliefs. Not only in the province of religion, but in that of science, the opinion of the multitude, founded on the accumulated experience of ages, hits the truth more frequently than scholars and scientists are apt to suppose. In old-fashioned, rude cures for wounds (*e.g.*, tarry twine or whisky rag), antiseptic surgery was anticipated, and so with the puccinia graminis. The vulgar recognised the connection between the Barberry and the rust of wheat long before the fact had an incontestable scientific basis. It is remarkable that while only within the last few years that connection has been made the subject of investigation, in the end of last century the planting of Barberry bushes in the neighbourhood of corn fields was actually prohibited both by law and custom in certain agricultural districts. In the second place—Be cautious in your acceptance and application of new discoveries. It was unquestionably a great discovery which Pasteur made when he traced the charbon (or as we say "sturdy") of sheep to the Bacillus Anthracis, followed up by Koch in his discovery of the Bacillus of tubercle and by other observers. But if the alternation of generations holds good in such a fungus as Wheat rust, a parasite on living vegetable tissue, why may it not prevail among the Schizomycetes, essentially parasites on living animal tissue? The entire life history of Bacteria and Micro cocci has not yet been ascertained, and before it is thoroughly traced no man can say how the diseases attributed to them are related, and whether a deeper pathology may not discover connections between forms of impaired vitality in different organs, which will revolutionise not only the present theories, but even the practice of the healing art. As the interest, however, of my paper to most of you will lie in its bearing on field work, iet me hasten before I close to allude to the fungi which are everywhere abundant in autumn, and are the most likely to attract the attention of collectors. They mainly belong to the order called Basidiomycetes, so termed because the spores are formed on the ends of stalk-shaped cells, which are called basidia. Each basidium bears on its summit usually four slender processes, on each of which again is set a spore. There are also barren ones, named paraphyses, without spores. All the basidia

and paraphyses taken together are called the hymenium, and hence the term hymenomycetes employed by the great botanist Fries as the title to his well-known work of which Cooke's "British Fungi" is simply a translation, "Hymenomycetes Europaei." Almost all the common mushrooms and toadstools which garnish our dells and woods at the mellow fall of the year belong to the Basidiomycetes. A very few conspicuous fungi, some of which appear in spring rather than in autumn, belong to quite a different order, i.e. to the Ascomycetes, so called because the spores are formed and contained within cases or asci, eight spores being usually enclosed in this way. The well known Peziza, Morel, and Truffle, belong to the Ascomycetes. But these you will only rarely obtain in comparison with the *embarras des richesses* of the Basidiomycetes. Let us suppose, then, that a young botanist, new to the task, enters a wood to collect fungi. Probably his eye is attracted to a showy figure standing four or six inches high and displaying a broad, brilliant scarlet top, studded with yellow spots, which offer in their striking yet harmonious contrast to the surface which they adorn a very pleasing spectacle. He examines its structure. He observes that the cap of the fungus conceals under its red expansion plates or gills set edgewise on its lower surface, and if he examines these when he gets home he will see them studded with the basidia of which I have spoken surmounted by their spores. Laying the cap—gills underneath—on a piece of paper he will find that in the course of a few hours the spores will drop off and shew the arrangement of the gills in rays of white dust. The stem on which the cap is set is furnished with a ring, being the remains of the wrapper by which the plant was enclosed before the pileus expanded sufficiently to burst it, and the yellow warts or specks on the upper surface are in a manner relics of that original wrapper or volva. Below the stem he finds the mycelium, shooting like rootlets through the soil or through the substance on which the specimen is growing. He must specially endeavour to answer the following questions:—1st, Is the hymenium spread over gills or plates, radiating from a centre? If so, it is an agaric, it belongs to the great order, the Agaricini. 2d, What is the colour of the spores, white, brown, purple, or black? If they are white (as they are in this case), the agaric is included within the division, the Leucospori. 3d, How are the gills related to the stem? Are they quite distinct from it? Or do they run

down the stem; Or do they show a notch just where they join it? Or is the stem of one consistency, being as it were cartilaginous, while the cap is of another, soft, wet, and fleshy? Lastly, Is there a ring or the remains of a ring, or no indication that any ring has been ever present? When he has correctly answered these questions he holds the key of the position, so to speak. He will have no difficulty in overcoming the few remaining details necessary to his recognition of the fungus. He will identify it as the Agaricus Muscarius, one of the most beautiful and one of the most deadly of its tribe. Should he pursue his investigations regarding it still further, he will even be led into a legendary region far away from the province of science proper. Travellers' tales recount wonderful things of the Agaricus Muscarius, or fly-agaric. It is said that the natives of Siberia know how to utilize it as an intoxicant, that it even imparts its virtues to their natural secretions, and that with one or two of these fungi to begin with a party may shut themselves up in a room and enjoy a week's debauch. The student will wisely reject such fables, but if he wishes to acquire for himself the pleasure and honour of scientific renown he will set his energies to the task of investigating the poison contained in the fungus. As far as I am aware no successful attempt has been made to determine the composition of Muscarine—indeed, the chemistry of the fungi is a department which still awaits its master. Now just as I have supposed a young mycologist to pursue his studies in woods where the Fly-agaric is to be found, so must every fungus collector do wherever he obtains his specimens. The presence or absence of gills, the colour of the spores, and the relation of the stem to the cap, and gills are the very first points to which attention must be directed. The largest fungi have no gills. Their spores are contained in tubes, and they form an order called Polypori, or many-pored fungi. A very delicious esculent, the Boletus edulis, imported from France in tins and sold as *cepes*, belongs to this order. I have collected and eaten it at home for nothing with much satisfaction, and I have paid a good price for it as a dish in one of the best restaurants in Paris. It is said that all Boletuses are edible, when taken with a sufficiently large admixture of common salt, but one called the Devil's Boletus and not a few of its neighbours that change colour on being broken are certainly bad both by name and nature. Further examination of the fungi

will bring to the student a knowledge of orders of Basidiomycetes, which have neither pores nor plates. The spores may be immersed in a mass of jelly, or they may fructify on an even surface, or they may be produced within a bag, as in the case of the Puffball, which opens when they are ripe. All these members and many more of the fungal family are procurable in abundance at the right season, so that a fungus foray becomes one of the easiest and most enjoyable excursions of a Naturalist Club. I confess that my field Botany has become somewhat rusty of late for want of use, but I shall be glad to do my best when the time comes to introduce the members of this society who may wish it to some of my best known friends among the Agarics and Polypores. Perhaps I ought to have touched on the subject of mould, the potato disease, ergot of rye, and other interesting aspects of the fungi which I have left unnoticed. Time forbids me on the present occasion to go further than I have done. By your kindness I may have a future opportunity of continuing the subject, and treating it with less demands on your patience than I have been obliged to make this evening.

The lecture was illustrated by numerous diagrams, kindly lent for the purpose by Professor Dickson, Edinburgh University, to whom a vote of thanks was awarded at the close, as well as to Mr Robertson.

The monthly meeting was held in the Smith Institute on Tuesday evening, 2d Feb., 1886—Rev. Mr Goldie in the chair. There was a large attendance. As Mr D. Chrystal, secretary of the society, was engaged elsewhere, the minutes of former meeting could not be read, and the business of the evening was forthwith proceeded with. Mr Goldie in appropriate terms introduced Miss M'Lagan, Ravenscroft, who had prepared a paper on "Iona and its Sculptured Stones," and Miss Colvin, who had kindly undertaken to read the paper for Miss M'Lagan.

At the close, Provost YELLOWLEES, in proposing a very hearty vote of thanks to both ladies, said he had listened to Miss M'Lagan's paper with very great interest. First to the interesting biographical sketch of the saint to whom we in Scotland owed so much; second, to the graphic description of the physical

features of the island, but the chief interest of the paper lay in the account of the ecclesiastical remains. He had often heard of Miss M'Lagan's artistic skill in reproducing these ancient memorials, but this was the first time he had had the pleasure of seeing them for himself. Miss M'Lagan had spoken of the Scoti, the early inhabitants of the Hebrides. There were also Scoti in the neighbourhood of Stirling, for the earliest Burgh coat of arms of Stirling bears the legend, which freely translated runs thus :—"Here on this side stand the Scoti protected by the cross, here the Bruti protected by their arms, which may be held to mean that the Scoti had embraced Christianity while the Bruti were still heathens. He had much pleasure in proposing a very hearty vote of thanks to Miss M'Lagan for her valuable paper, and for the beautiful rubbings which she had exhibited in illustration thereof, and to Miss Colvin for her admirable reading. The thanks of the meeting were then formally conveyed to both ladies by the Chairman.

Fifteen rubbings of ancient sculptured stones from Iona were exhibited on the walls, and beautiful shells and pebbles, from the beach at Iona were laid on the table. A vote of thanks to the Chairman concluded the business.

IONA AND ITS SCULPTURED STONES.

By Miss M'Lagan, Ravenscroft.

In submitting to the inspection of our society, "Rubbings" from the sculptured stones of Iona, it seems to be needful to say a few words about the island itself, and to show how it has come to pass that we find there so many beautifully carved stones. Of the structure of this islet. we are told by gealogists that it is one of the oldest bits of Scotland, and even one of the first portions of dry land that appeared on this globe, being a morsel of what is called *Laurentian gniess.* The position of Iona in Scotland is that of an outpost of the Island of Mull, being separated from its long projecting southern promontory by a sound not much more than one mile in breadth. In general appearance it is flat. Dun-y, its highest hill, is but a dwarf compared to those of the surrounding lands. Its surface everywhere abounds in rocky hillocks, bare and tempest-swept, but of no great height. In the middle of the island there is a considerable portion of arable land under good cultivation, and along its shores are portions of beautiful links, whose soil is composed of pulverized shells of land snails. The extent of

Iona is 5 miles in length and 3 miles in breadth. It has indeed few attractions to the outer world save what has been added by the Christian heroism of one brave man. The island has been known by many names, but to the Celt chiefly by those of Y. Hi. I—thus variously written, but all pronounced 'E,' also that of "Columkil," or the "Isle of Columba of the Cells." In his time it was inhabited by the Scoti race, so was called Scoti, and the modern Scotland was called Alba, at the same period the Scots had established themselves in Cantyre, founding the Dalriadic Kingdom. Thirteen hundred years ago Iona was a heathen isle, but preparation was being made to send the gospel thither. The place was being fitted and chosen for its messenger, and this too in a manner apparently most unlikely. In a yet more ancient page of church history we read that one of its greatest deliverers fled from Egypt red-hand with human blood, so in like manner red-hand Columba fled from Ireland. True, not stained with the blood of one man only, but with the guilt of a bloody war on his conscience, a war that is affirmed by something more than tradition, to have had its origin in a quarrel about a favourite manuscript copy of the Psalms of David, Columba having been by his ecclesiastical superior refused possession of the coveted MS, stirred up his kindred to make war to satisfy his offended pride. Fortunately there remains a document corroborative of this portion of Columba's history, which we quote. "We may here mention one relic of Columba, which is that called Cattach or 'Book of Battles' (the battles above referred to), preserved in the Royal Irish Academy of Dublin, it is an heirloom of the great clan Conaill handed down from St Colum-Cille through the line of the O'Donnells for a period of 1300 years; this 'Cattach' consists of a highly ornamented casket of silvergilt and stone set, surmounting older cases, and enclosing fragment of a copy of the Psalms on vellum, being 58 leaves written on both sides. The first 30 Psalms are awanting, but from the 31st to the 106th Psalm still remains. The character in which this document is written is of very ancient type." Another relic is the crosier or rather staff of St Columba which still exists and is at present in the Royal Irish Academy." [*N.B.*—We incline to think this last a doubtful article.] From this story of the "Cattach," it would appear Columba ultimately obtained the much coveted M.S. Repenting of this revengeful war, in deep contrition of

soul and under the censure of the church he resolved to leave his native land and labour to spread the gospel of Christ.

Anno Domini, 563, in his "Currach," or Boat of Hides, Columba pushed from the shores of Ireland, seeking for ever to hide it from his sight. Coming in among the Western Isles his first landing place was on Islay, but it was too near Ireland and probably also much too large for him to be likely to become "monarch of all he surveyed." On he went to Jura, it had all of the same faults, to Oronsay, it was of fitting size, but looking from its heights, alas! his native land was seen, this would not do for him. Onward then he must go, he comes, and coming at last to our Island all his desires seemed satisfied, and there, at Port-na-Currach, he landed. That this was his landing place, it is true, has no better foundation than the voice of of tradition, but it is one which has a right to be listened to, as many things concur in pointing it out as the most likely haven. We shall refer to this place at another time. Such was the impulse which drove Columba thither. Let us now take a look at the man himself. By birth he is said to have been of the royal race of the Scotic Kings, and was born in Ireland, at Garton in Donegal, A.D., 521. His father Fed-lizuids, and his mother Eithne, were of the reigning families of Ireland and Dalriada. He was ordained to the church by Etchen, Bishop of Clonfad. It was in the year 565 that he landed at Iona. Before taking possession of the Island he is said to have got a gift of it from the King his kinsman. Taking into consideration all these royal attachments may help us to account for the swift and firm hold which his teaching acquired on the nation.*

In person, he is described as being a man of commanding appearance, tall and powerfully built, possessed of a voice of marvellous strength and melody, (to be heard 5 miles off is incredible, though such is affirmed of it!) In his 42d year full of zeal he at once shews the energy of his nature, for no sooner was he well landed on Iona, than we hear of his work begun. Right across Scotland he goes to Craig Phadrick Castle near Inverness, to visit the King of the Picts, a fact which to us bestows on that ancient Vitrified Fort a lively interest. We have stood on its ruins, and can figure to ourselves the Holy Columba climbing its steep

* The order of St Columba numbered above 100 Abbeys in the British Isles.

ascent, and from its lofty summit gazing around on the land far and wide which he had determined to win for Christ. Then he goes to Aberdeenshire to visit St Drostan, thence to St Servan, Loch Leven, and turning westward he visits St Kentigern. In his own immediate neighbourhood a favorite place of resort was the Island of Tiree, where indeed there are said still to linger more traditions of him than in "Y." itself. Religious Houses were early formed there, and the Island long continued the Granary of Iona. It is rich in monumental stones and crosses, among them one of an Abbot (exhibited) which though now in Tiree has probably been stolen from Iona. Beyond all this he in his frail "Currach" is believed to have visited Orkney and Shetland, even inhospitable Iceland was not too great a venture for him or his disciples in their Christian zeal, for in long after ages when Norsemen went there they found Crosses, Bells, and Books of the Monks of Iona. We shall now turn to the Columban landing place, the "Port na Currach." Since those far distant days it may be that but little change has come over the scene,—a few more beaches of its beautiful pebbles may now be cast up on its strand, but the rocks which on either side close in the bay, must have looked down upon it much the same as now. The bay is a pleasant one, sloping gently to the south. Landward there is a considerable expanse, many acres in extent, of level country, the portion of it nearest to the sea is a singularly green grassy glade, further inland it has now gone to moor and moss, though in Columban days it may have been what Dean Monro describes as the condition of Ireland in his time, that it was "fertile and fruitful of corn and store." The greater part of this little strath has been formed by a succession of beaches thrown up by the heavy Atlantic surf which beats into the bay. It was our great good fortune to see the ocean in its wildest mood, on a day when with unwonted force the gigantic waves rolled in, in all their might, and when their ponderous weight burst on the shore, the ground was felt to tremble beneath our feet. The beach making process was seen in full operation as the multitudinous pebbles were being driven landward the while. The scene was one of awful grandeur. We were compelled from time to time to lie down on the ground by the force of the tempest, content to bear its buffetings for the rare enjoyment of such a sight. The islesmen said the like had not been for 20 years. On the grassy glade

running up from the beach is a row of stone circles, obviously the poor remains of what once were human dwellings. We did not measure their diameter because of the storm, but shall venture to name 12 feet inside, with walls say 4 feet in thickness. Of these, the furthest inland has two walls concentrically circular, marking it out as having been the home of the chief man of the settlement. Still further inshore are the massive remains of an oblong building, whose walls are formed of very large stones. One would be inclined to think that this structure had been the place of worship of the small community. There is a foolish legend attached to it, that the followers of Columba built it so, in order to represent the 'Currach' in which he landed. Many remains of churches are still to be seen among the Western Isles of no larger dimensions than this structure. May we suppose that these "Clachans" remain from the days of Columba? All we can say in reply is, that the material of them may last as many future years, as we are supposing they have done of the past, and we may add that just such like were the buildings all over Scotland at that era. It has long been a habit common to antiquaries, and while treating of the houses of these times to say "there are no remains of the Culdee churches, because they were built of wood, and wattle, and clay." This talk has surely come from the furthest South (where stones are scarce) as did the teaching of the "Druid circles," and equally they are for us, unwise hearsay. Pity it is, that so much of mere hearsay passes for antiquarian lore. Let us look at this subject as it touches the homes of the Columban community. On this small tempest swept Iona, as we see it in our day, there are neither tree, wattle, nor clay. And if we are to fancy their existence in the long past ages, we see no remains of these building-material possibilities to give sanction to such a conjecture. There is no peat to hint of, wattle, and few will believe in trees, as for clay we know not where it can be found in the midst of the island sands. Contrast, now, this barrenness of evidence for the wood and wattle theory, with what can be said in support of a stone theory. Certainly it would raise a smile on the face of even the blind, were you in Iona to ask where are we to find stones? Everywhere over the Island they lie, mighty boulders some, and every size besides. Old chronicles tell that the disciples of Columba dwelt in separate cells (kils), (May we say circular ones?)

even after they removed from their first landing place and took up their abode on the present sacred ground. At what period this removal took place is not known, but was probably an early one, as all the Columban traditions cling round the neighbourhood of the Cathedral, and in corroboration of this the foundations of buildings of the most ancient type are found there. Can we wonder that uncertainty should hang around this period, when we call to remembrance how remote it is, and that the story of Columba is the first sure record on which the history of our country is built. He stands before us in vivid portraiture at a period earlier than the Heptarchy, and while the Roman legions still had a foothold in Britain,. The Columban period having come to a close, the next record we have of the affairs of his Disciples is from an Irish Chronicle, A.D. 794, in these ominous words—"Vastatio omnium insularum a gentilibus"—(Devastation of all the Islands by the Heathen.) From this date forward for 300 years Iona was frequently desolated, its churches and monastries burned, and its "Brethren" murdered by savage Norsemen." Again, another authority says—"About the year 801, Iona was burnt by pirates, in 806 it was again laid waste by them, and at the same time 68 of the inhabitants lay and clerical were put to death leaving only 65 alive, in 985 the Danes also wasted the Island." The memory of one of the cruel massacres is preserved in one part of the shore being called the "Martyrs' Bay." Such are the necessarily brief notes we use as an introduction to the Iona of the present to which we shall turn.

And now we shall look at the comparatively modern and yet to us still ancient buildings which owe their existence to the memory of the great, good Columba. Of these we shall say very little more than may serve to shew how amongst them are spread out the venerable stones, "Rubbings" from which we now submit to your inspection. 1st, the Cathedral Church (one of no small architectural beauty.) It is built in the usual cruciform shape. The Nave is 115 feet in length and 23 feet in breadth, the length of the transept being 70 feet. Its tower and external aspect is well known from numerous photographs. Roofless as the venerable grey walls now stand, we would still trust that it is no hopeless wish that they may again upbear one, cover a worshipping assembly, and also protect from fast coming utter destruction, the many

beautiful and valuable sculpturings lying around; trodden under foot and wasted by the elements. These monumental stones are of real value, both as illustrating our national history, and as exhibiting a Celtic art, superior to that produced by any other country in Europe. Should we not earnestly seek their preservation? To whom the ecclesiastical property of this island belongs of right, we are not able to determine. That it is church property even now, may be surmised, for we find it stated that the Presbyterian Church Courts ordered the destruction of some of the crosses because of their being objects of idolatry, plainly acting on an understood right. The property of the island (with this exception) is that of the Duke of Argyle, under what title the subjoined letter will show. "This island was, as you know, church land from time immemorial, and from 13th to 16th century belonged to the Benedictine Monastery of Iona. When monasteries were secularised at the time of the Reformation their possessions were granted by the crown to various laymen in commendation. The Abbey of Iona was granted to the Bishops of the Isles as commendator, but the secular possession to the Macleans of Duart by a crown charter to Hector Maclean in 1587." "In 1640 the temporalities were given by the crown to James Livingstone, keeper of the Priory seal, and by him in 1648 was resigned in favour of Archibald, Marquis of Argyle." This is an extract letter from Dr Skene, Edinburgh, to Emeritus Professor Blackie, 15th Nov., 1884, in reply to enquiries for my information. 2d. On the northern side of the Cathedral are the rather extensive and interesting ruins of a Monastary; and 3d. At a considerable distance eastward (and near the village) are the remains of a Nunnery, also interesting even in its fragments. Pennant says of it—"The nunnery was filled with canonesses of St Augustine, and consecrated to St Oran; they were permitted to live in community for a considerable time after the Reformation, and wore white gowns, with a rotchet of white linen above it; the chapel is 58 feet by 20." More ancient still than any of these, is the Chapel of St Oran's standing in the middle of the "Relig-Oran," where the mighty dead are laid, Kings of Scotland and of other lands. This church, 500 years after the death of Columba is said to have been built by Queen Margaret, on the site of the much older edifice of Columba, and indeed to be a restoration. [Reeve's Adamnan, page 140.] It is a handsome stone structure not without archi-

tectural ornament. How it can be the restoration of a previous structure of wood and wattle, is a mystery which will have to be explained by those who hold that architectural theory! In this venerable burying place the few sculpturings that can now be identified are chiefly those of men and women of sacred office. The inscriptions on these reveal to us, the not unimportant fact, that in long succession the Abbots of Iona were married men whose sons inherited their fathers' office, and of some of these we shall have occasion to speak in our list of "Rubbings." After the usual manner of dwarfing the importance of women, common to the writers of that day as well as of our own, we find no mention how or where they buried the wives of the Abbots, and the mothers of that long succession of Ecclesiastics. Indeed it may be a question whether their bodies were permitted to rest in this "haunted holy ground." Certain it is, that the Highland chiefs while earnestly coveting this honour for their own remains, did not by any means think it was due to the ashes of their wives! We think our hearers will have pleasure in hearing these same places described in the quaint and graphic words of Dean Monro as he tells how they appeared in his day: —Narrest this be twa myles of sea layes the ile the Erishe callit I-Colm-kill, that is Sanct Colm's ile ane faire mayne ile of twa myle lang and maire, and ane myle braid, fertill and fruitfull of corne and store, and guid for fishing. Within this ile there is a monastary of monnckes and ane uther of nuns, *with a Paroche Kirke, and sundry uther chapells,* DOTAT *of auld by the Kings of Scotland and be Clandonald of the iyles.* This Abbey forsaid was the Cathedrall Kirke of the Bishops of the iyles, sen the tyme they were expulsed out of the ile of Man, by the Englishmen, for within the ile of Man was ther Cathedrall Kirke and living of auld, as I have already said in the description of that ile. Within this ile of Colmkill there is ane scantuary also, or Kirkyaird callit in Erische Religoran, quhilk is a very fair Kirkyaird and weill biggit about with staine and lyme. Into this sanctuary ther is three tombss of staine, formit like little chapels, with ane braid gray marble or quhin stane in the gavill of ilk ane of the tombes. In the stane of ane tombe there is written in Latin letters "Tumulus Regum Scotiae," that is the Tome ore grave of the Scotts Kinges. Within this tombe according to our Scotts and Erishe cronikels there lays fortey eight crowned Scotts Kings through the quhilk this ile has been

richlie DOTAT* be the Scott Kings as we have said. The Tomb on the south syde forsaid hes this inscription—Tumulus Regum Hyberniæ, that is the Tombe of the Irland Kinges—for we have in our auld Erishe Cronickells, that ther was foure Kings of Irland Eirdit in said Tombe upon the north syde of our Scott's tombe, the Inscription hearis "Tumulus Regum Norwegiae" that is tombe of the Kings of Norroway: in the quhilk tombe as we find in our ancient Erishe cronickells, there layes eight Kings of Norroway and als we find in our Erishe cronickells, that Ccolns, King of Norroway commandit his nobils to take his bodey and burey it in Colmkill, if it chancit him to die in the iles, but he was so discomfitit that ther remained not so maney of his armey as wald burey him there, therefor he was eirded in Kyle, after he stroke ane field against the Scotts and was vanquished be them. Within this sanctuary also lyes the maist part of the Lords of the iles and ther lineage. Twa clan Lynes with their Lynage, M'Kynnon and M'Guare with their lynages with sundrie uthers inhabitants of the hail iles, because this sanctuarey wes wont to be the sepulture of the best men of all the iles and als of our Kings, as we have said, becaus it was the maist honorable, and ancient place that was in Scotland in thair dayes as we reid."

As it is only through Monkish chronicles that we have information of this religious settlement, we must expect that their habits of teaching will give tone to the accounts they have left us of the nature of the Iona cult, ecclesiastical and social arrangements, but from out the maze of unbelieveable miracles, we can draw the conclusion that the type of the community was that of the family, a "Father" or Abbot, and a band of brethren. Columba did not acknowledge the Papacy, nor did his successors, until Margaret, Queen of Malcolm Canmore, forced submission to Roman authority upon them in a very stringent manner. Episcopacy had no place among the 'Brethren.' It is true the word Bishop is sometimes mentioned, but he is always subordinate to the Presbyter or Abbot. As to Presbyterianism, they had no church courts. Touching their beliefs, Columba came to this country with Holy Scripture in his hand, to the all-wise teaching of which he no doubt added some of the superstitions of the age, but he and his disciples did not worship the Virgin Mary, and it is not till the last of the Prioresses was

*Query—What has become of the doting?

laid in the grave, that we see on her tombstone, "Sancta Maria Ora pro Me." Our paper does not require us to enter more deeply into this subject. One valuable fragment of the religious teaching of the Monks survives to us however, and we are happy to transcribe it as being worthy of imitation by the religious teachers of our own day, it is the "Law of Sanctuary." The precincts of these tombs was held sacred, and enjoyed the privilege of a "girth" or sanctuary, these places of retreat by the ancient Scotch law were not to shelter indiscriminately every offender, as was the case in more bigoted times in Catholic countries, for here all criminals were excluded, and only the unfortunate dilinquent or penitent sinner was shielded from the instant stroke of rigorous justice. The laws are penned with such humanity and good sense, that the reader cannot be displeased with seeing them in native simplicity. "Gif any flies to Halie Kirk, moved with repentance, confesses there that he heavily sinned, and for the love of God is come to the House of God for safety to himself, he sall nocht, tine life nor limb, but quhat he has taken frae anie man he sall restore same ikill to him, and sall satisfy to the King according to the laws of the countrie."—Pennant, 1772. These 'Rubbings' do not represent the stones as they were originally, but as they now are wasted and worn by the hand of time. We subjoin a list of those now suspended on your walls, space allowing of only 15 being hung, while the entire number of our Iona "Rubbings" is upwards of 50.

No. 1.—The inscription on this tomb, was as follows :—Hic Jacet Domina Anna Donaldi Terelti Filia. quondam Prioressa de Iona Qu-ae obit ano Mo. Do. x Co 117o Egies animam. Altissimo : co mendamus :—This lady is said to have been a Princess of Scotland and was the last Prioress of Iona. Only half the stone now remains; the other half had carved on it the Virgin Mary and child. Across the centre of the stone is the "Sancta Maria ora pro me." The fall of a fragment of the Nunnery broke this stone. A lady well acquainted with the customs of our Highlands assures us that this dress of the Lady Anna is no sacerdotal one, but simply that worn by all ladies of good position, even till very recent times. This confirms the opinion of Dean Stanley as to clerical dresses.

No. 2.—This four-paneled stone is the monument of "four Priors of Iona—of one clan." "Hic jacet quatuor Priores dy — ex una Natione V : Johannes,

Hugonius, Patricius, in decretis olim Bachlarius. alter Hugonius qui obit an Dom Milless mo qiungentessimo." Note, touching the latter sentence of the inscription on this tombstone. "Graham's translation of 'Ex una Nationie' into 'From one clan' may be accepted as Natio is sometimes put for a tribe as well as a district. He is, however, wrong in rendering 'Olim in Decretis bachlarius,' 'late Bachelor in Degrees,' the reference being to the official staff-bearer.—He died in 1500.

No. 3.—This stone had been stolen from Iona, and taken to Kilvicuan, alias MacEwan's cell, in the Ross of Mull; is now restored to St Oran's by the Duke of Argyle. (*N.B.*—The practice of stealing stones from Iona has been but too common.) The inscription is curiously arranged and partly obliterated, but may be translated thus:—"Here lies Blessed Christoforis, Late Prior of Iono. May God be merciful to His Soul."

No. 4.—The shaft of a cross, both sides sculptured. The inscription is as follows:—"this is the cross of Lachlan MacFingone and His son John—Abbot of Iona, made Anno Domini 1489." All these MacFingonies are said to be descendants of Fercher Fada, Scottish King of the House of Lora.

From Tiree.

No. 5.—Inscription around this stone is:—"Fingone Prior of Iona gave me to Philip John's (son) and to his sons in the year of (our) Lord 1492." Prior Fingone seems to be ancestor to the MacFingones or MacKinnons. The cross of Lachlan MacFingone at Iona, is dated 1489. His son, Abbot John, died in 1500. If the latter be Philip's father, and if Lachlan be the son of the Prior, Philip was his great-grandson, and the sons above mentioned were probably Fingone's, not Philip's, and therefore Lachlan's brothers.

No. 6.—Inscribed stone of Islay and Cantyre, commonly called Innus or Angus Oig, the chief of the name. He was a strong friend to Robert the Bruce, was with him at the battle of Bannockburn. His inscription was:—"Hie facet corpus Angusi Fili Domini Angusi M'Dombaill de Islay."

No. 7.—MacLeod's stone—In the centre a small effigy of that gentleman.

No. 8.—Inscription, now effaced, runs thus:—"Hic Jacet. Mariota Filia Johan Lauchlani Domini de. . . .

No. 9.—For Macleod of Torloisg, an Abbot is substituted.

No. 10.—Mac-Quarrie, chieftain of Ulva.

No. 11.—The stone of two Nuns with 2 pairs of shears. It is understood that stones with shears carved on them are invariably those of ladies.

No. 12.—An Abbot with two Monks.

No. 13.—Cross Morven.

13.—Cross Morven.

For the deciphering of these difficult inscriptions I am greatly indebted to the kindness of the Rev. Dr Joass of Golspie.

The usual monthly meeting was held in the Smith Institute on Tuesday evening, 2d March—Rev. Mr Goldie presiding. After preliminary business Mr Goldie introduced Mr A. F. Hutchison, M.A., Rector of High School, who had prepared a paper entitled "Tumuli at Craigengelt." Mr Hutchison referred in the first instance to the methods adopted by modern archæologists to classify these burial mounds. He regretted that owing to the severe and long continued storm he had been unable to prosecute any personal investigation as to the tumuli on Craigengelt, as on the occasion of his visit the ground was deeply covered with snow. What information he had to lay before them that night was therefore at second-hand. The existence of numerous tumuli on Craigengelt pointed, he thought, to the very early civilisation in the valley of the Carron. The best known of the tumuli locally named the "Ghost's Knowe" was opened in 1839. It was found to consist of an outer covering of earth, with a cairn of stones of all sizes methodically piled over a cromlech, which in its turn protected a stone coffin, in which lay a skeleton. This at the time of burial, had evidently been wrapped up in some material of an antiseptic character, as it was of a black colour, and when exposed to the air had a resinous odour. Some interesting articles were found buried in the mound, but the most valuable of these were stolen in the proprietor's absence, brought to Stirling, and disposed of. They had never been seen since, although it was believed they were still in existence. Among the number was said to be a gold horn or drinking cup. A beautifully wrought stone axe and a small gold ring were all that were left to the proprietor. The latter had evidently been set with jewels, but they had either been lost or taken out. The "Ghost's Knowe," which was of considerable extent, was surrounded by a circle of standing stones, twenty-five feet

apart, supposed to represent the chiefs of note whom the buried warrior had slain in battle. A very hearty vote of thanks was passed to Mr Hutchison for his paper, much of the information it contained being quite new to the members of the Society, and it was agreed—subject to Mr Hutchison's convenience—that an excursion should be organised during the summer to Craigengelt, so that members of the Society might have an opportunity of investigating these interesting remains.

Mr Gilbert M'Dougall next read "Notes on the Pairing of Birds," after which votes of thanks to Mr M'Dougall and to Mr Goldie for his conduct in the chair wound up the proceedings.

NOTES ON BIRDS.

By Mr Gilbert M'Dougall.

On the return of the nesting season the question may be asked—Do birds choose new mates every spring, or do they remain faithful to the old ones? My opinion is that being once wedded they remain wedded for life unless, if they be migrants, they lose each other in their flights. The following facts have strengthened that opinion. Crows *(corvus frugilegus)* if their nests be not blown down, clean them out every season, and add fresh materials. Indeed they do not leave their nests for any length of time. Where, as in the neigbbourhood of Stirling, the rookery is not beside the roosting place they visit the nests every day. I have observed them collecting building material in mid-winter, and neither crow nor man would think of furnishing a home without a partner. It would be unnatural. After leaving the scene of their night's repose and after partaking, it may be, of a scanty meal, they invariably fly to the rookery, and engage in half an hour's cawing. And they may be seen perched in pairs nigh to their nests, or the boughs where the nests were, if the nests should happen to have been blown down. The Bullfinch*(Pyrrhulla Europœa)* is a loving bird and fond of its mate. In woods where such birds are few in number, they are always in pairs, and the one will fly no distance without the other. When they lose sight of each other, as they sometimes do, one of them may be seen perched upon the topmost boughs of a tall tree calling for its mate. Where they are plentiful they keep together and feed in pairs. The Sparrow *(Passer domesticus)* mixes indiscriminately with its kind during the day, but at night these birds repose generally in pairs. Or if a number frequent a house

there will be found an equal number of males and females. The Great Titmouse *(Paru major)* is a solitary bird seldom found in any other company than that of his mate. Even in winter they go together upon foraging expeditions. . . . . The Blue Titmouse *(Parus cæruleus)* when not in flocks also fly in pairs. . . . The Long-tailed Titmouse *(Acredula candata)* is a family bird. The young brood accompany the parent birds until spring when they leave and commence housekeeping for themselves. What then can be more likely than that the parent birds should continue in wedlock? The Patridge *(Perdix cinerea)* and grouse *(Lagopus Scoticus)* also live together as a family until spring when the young leave the family circle to rear a family of their own. After this do the old birds renounce former alliances and choose new mates? I think not. When the Swallows *(Hirunda rustica)* and House Martins *(Chelidon urbica)* return to their summer retreats they clean out their old nests, putting in new lining; but if the old nest has disappeared they build a new nest where the old one stood. Are these nests occupied by the first swallows that return, or by the former pair? I think that it is the old pair in their old home. But owing to the striking likeness of the feathered tribes of the same species to one another perhaps we should not be too absolute in our assertions until we have captured and marked the birds. Still general facts favour our opinion. A pair of Coots *(Fulica atra)* have haunted the banks of the Forth, opposite my house, during the winter and the past autumn, will they now bid good bye after keeping company so long? The Pheasant *(Phasiamus colchicus)* and Black game *(Tetras tetrix)* with all our domestic poultry are—Mormon like—polygamous tribes, and do not live in pairs. But our domesticated pigeons are beautiful examples of faithfulness to one mate. I have thought it might be of interest to bring this subject forward, in the shape of a short note, for discussion. Some of our members may be able to give us additional light and enable us to arrive at more certain conclusions.

The usual monthly meeting was held in the Smith Institute on Tuesday evening, 6th April—Mr A. F. Hutchison, M.A., rector of the High School, presiding in room of Rev. Mr Goldie who was unavoidably absent. Letters of apology for absence were read from Mr Goldie, and from Mr R. S. Shearer.

Mr David Chrystal, secretary, read minutes of former meeting, after which the Chairman introduced Mrs Hogg, *Stirling Journal and Advertiser*, who read a paper intitled "Colonel Edmond: A Son of the Rock in the 16th Century." At the close a very hearty vote of thanks was, on the motion of Mr Moyes, accorded to Mrs Hogg by the meeting. An interesting conversation ensued on the habits of rooks and jackdaws, and their practice of robbing the nests of the missel-thrush and other birds of the eggs. Mr Sword said that the food of the young jackdaws, great numbers of which were reared in the Castle rocks, consisted principally of eggs, especially those of the lapwing. Some very fine specimens of the Golden Eared Duck, male and female, of the Goosander or diving Merganser, and of the Scaup Duck, the last a very rare visitant to the district were exhibited by Mr Sword. The Scaup was found at the confluence of the Allan with the Forth, the others in the Forth, near Blackgrange. In the gullet of the male Merganser were found four newly swallowed roach, and two partly digested. The roach, we understand, has hitherto been rarely found in the Forth. Mr Kidston announced that a letter had been received from the secretary of the Perthshire Natural History Society proposing a joint excursion of the two societies, on Saturday the 12th June, the locality, in the Forth district, to be fixed by the Stirling Society. On the motion of Mr Hutchison, the matter was left in the hands of the council to make all necessary arrangements.

COLONEL EDMOND: A SON OF THE ROCK IN THE 16TH CENTURY.

By Mrs Jane D. Hogg.

The sketch of the life of Colonel Edmond, a "Son of the Rock" in the 16th century, which I have now the honour of laying before you this evening, can in no sense be considered either as original or exhaustive. I have merely pieced together such fragments of information as I could gather from local histories, supplementing these when the narrative required it from such other sources as were open to me. Much, however, remains to be told, and we shall only have a full and complete account of Colonel Edmond's exploits and achievements when the history of the gallant Scots Brigade, and its services in the Low Countries in the cause of civil and religious freedom, are given to the world. Ample materials for this purpose exist at the Hague, and only a chronicler is awanting.

Like the Green Brigade of Gustavus Adolphus, and the famous Scots Guard of France, the Scots Brigade of the States General of Holland "proved its value in many a hard fought field, and in some cases saved the countries it served. The bond, moreover, which ennobled the services of the Brigade, and stimulated its recruiting in the glens of Scotland by an inducement loftier than certain and liberal pay, was the conviction that those who joined it were not merely carving out their own careers, but were giving a 'harvest day's work' in the cause of the Protestant religion." From the time of William the Silent the saviour of, and the martyr for, the liberties of the Dutch Republic, till the triumph of Blenheim had made it finally certain "that no Most Catholic or Most Christian King should combine supremacy in Europe with enforcement of conformity to Rome," the Scots Brigade had stood in the forefront of the mighty struggle, and had poured out its blood like water. Nor were its services unrecognised or unappreciated, for at the siege of Bois-le-duc in 1629, Frederick Henry, Prince of Orange, bestowed on it the proud title of the "Bulwark of the Dutch Republic."

"Holland's Bulwark in many a battle of yore,
From the woods of Brabant, to the far Frisian shore;
Never Spaniard, nor Frenchman, nor German essayed,
To withstand the fierce charge of the old Scots Brigade."

Clement Edmond, one of the bravest and most brilliant soldiers in the records of the Brigade, was born at Stirling, in what was then known as the Baxter Wynd, somewhere about the year 1560 or 61. From both Christian name and surname, we should suppose he came of English ancestry, but be that as it may, the family appear to have been for some time settled in the town, and were now to all intents and purposes Scotch. His father was a baker and a freeman of the burgh from which circumstance we may conclude that he was a man of some substance. Of the childhood, or boyhood of our hero we know nothing. He would receive the hardy training common to all Scottish children of the period, and we may surmise that he went to the Grammar School of the Burgh, then taught by Thomas Buchanan, nephew of King James's famous tutor. I should not think, however, he would be a very studious boy. Like his contemporary, Shakespeare, he probably learned "little Latin and less Greek" during his school days, but I am quite sure from his after career that he was a stirring,

venturesome lad, ever the first when a daring deed was to be done, the boldest climber of the Castle rocks in search of birds nests, the foremost at the Hurly Hawky, on high days and holidays ever to be found at the butts eagerly watching the archery, or at the 'jousting flats' or the 'valley' when tilting or tournaments were the order of the day. The years of his boyhood were indeed the most brilliant in the history of our good old town. "Throughout the successive years of the Jameses," says Chambers, "the town had been increasing very considerably in wealth and trade. We can see from the books of the Royal Treasurers, which are preserved in the Register House, Edinburgh, that Stirling then possessed tradesmen and artists of a very high order, who purveyed articles of luxury to the Court, such as could not now be procured in the town." With the Castle, the abode of royalty, the noblemen and gentlemen of the Court, as well as others from the surrounding country, Mar, Morton, Lennox, Bothwell, Linlithgow, and others, made Stirling their residence. Many splendid mansions had recently been built in the 'Braid Gait,' as Broad Street was then called, and these were now occupied by their respective owners, in all the style and magnificence which characterised the period. The merchant burgesses and craftsmen were lodged in humbler fashion in the Bow, Baxter Wynd, St Mary's Wynd and St John Street, for that was the extent of the town in those days. The houses were in many cases built Dutch fashion, with their gables to the streets, the booths or shops formed of the vaults underneath the houses, and all the shop-windows were protected by stout iron stauncheons. The whole was defended on the south by a massive fortified wall, extending from the south-east corner of the Castle, right along the ridge. It crossed what is now King Street, somewhere near the Golden Lion Hotel, where stood the Port, the principal entrance to the town from the south and east. Thence the wall continued in a north-westerly direction, skirting the grounds of the Blackfriars Monastery, which, with its church and graveyard was outside the walls. The northerly defence was a deep trench, called the Stank, the remains of which might have been traced till lately. It extended from the Burgh Mill on the east, by the back of what is now Murray, Maxwell and Viewfield Places, and Cowane Street, and debouched on the Forth near the Old Bridge. A

gate on the south end of the bridge barred all access from the north, and for further security against attacks from that quarter, another gate was placed near what is erroneously called Queen Mary's Palace in St Mary's Wynd. The gardens on the north sides of Baker Street and Broad Street and on the south side of St John Street, had gardens radiating outwardly on either side. These, the enemy might occupy, but the backs of the houses formed a sort of second inner wall, protecting the actual town from invasion. The inhabitants of the burgh at that time numbered about 3000.

If it were a splendid era in the history of the town it was also a stirring, a turbulent, and a most eventful one. The Reformers in an access of misdirected zeal had shortly before laid ruthless hands on the convent of Greyfriars, on the monastery of Blackfriars and the Abbey of Cambuskenneth, and these stately piles were now lying in ruins. The Earl of Mar—haughtily defying augury—was building his palace on consecrated ground, and of consecrated materials, and young Edmond on his way to and from school, perchance stops boy-like, to watch the masons at their task and hears them discussing Knox's fierce denunciations of the unjustifiable act, as wanton sacrilege. We can fancy him, also, scanning with eager curious young eyes, the stately groups which thronged the streets, passing and repassing daily in new and ever picturesque combinations, like the changes in a kaleidoscope, all unconscious that these princely personages, these noblemen and gentlemen of lesser degree, were weaving the complicated web known to us as Scottish history. Down these streets on a January morning Queen Mary passes with her brilliant train, with laugh and merry jest, little recking that before her lies the tragedy of Kirk of Field, her abdication, the battle of Langside, her flight to England, all to be worked out in the space of two short years. The Coronation procession of her baby son passes and repasses on its way to Greyfriars Church; John Knox, the most notable maker of history of all the distinguished company. The Regent Murray rides proudly forth, and wots not that Hamilton of Bothwellhaugh lies in wait for him at Linlithgow, and that he shall never see another sunrise. Now, it is an archbishop—Hamilton of St Andrews—on his way to his doom on the gallows at Stirling Bridge; again by the north gate two wretched priests from Dunblane are haled through

the streets, pelted with stones by the jeering mob, and chained with their mass-books, vestments, and chalices, to the market cross. Again, the clash of arms rouses the citizens, for the retainers of the Earls of Crawford and Glamis are fighting out a blood feud in the Castle Wynd, and before interference is possible, the Chancellor of Scotland is slain. Or the Convention of Estates has met in Stirling, and the town is crowded with the flower of the Scottish nobility, unheeding of any danger. In the grey dawn of a September morning an armed band of 300 men, traitorously admitted, steal silently up the streets and surround the houses of the sleeping nobles. Eleven are made captive, including the Regent Lennox, grandfather of the young king, but the stout Earl of Morton steadily resists, and surrenders not till his house is set on fire, and the flames rise high in the morning air. Secure of their prey, the men at arms rush to plunder the town, stripping the booths and emptying the stables of the horses of the members of the Estates. But their triumph is short lived, for roused by the glare of the burning house and the noise of the tumult, the garrison of the Castle fly to the rescue. One band passes into Mar's unfinished lodging by the back way and opens a hot fire on the invaders; another, joined by the rudely awakened burghers, attacks them in the streets. And now a desperate hand to hand struggle, an indiscriminate melée of nobles, knights, citizens, men-at-arms, horsemen and footmen, captured and capturers, contest inch by inch every foot of way till the gate is reached, while the streets are thickly strewn with the dying and the dead. The tumult dies away as the pursuit is continued to St Ninians, but by and bye the gates unclose to admit a sad and sorrowful procession, for the Regent has been mortally wounded in the fray, and he is now on his way to the Castle to die.

Born in such troublous times, and nurtured, as it were, amid the clash of arms, can we wonder that young Edmond should chafe and fret at the homely calling and narrow life of a baker, to which he had been apprenticed when his school-days were over, or that he should "long to follow to the field some warlike lord." He made his own opportunity. Like many a lad before and since, in Stirling and elsewhere, he ran away. Truth, however, compels me to state that a story has been handed down which gives another complexion to his flight. It is said that he had removed a coin from one of the

collection plates at the church door, and was so overwhelmed with shame when his fault was discovered that he fled to the Continent.

We can easily understand how his steps were directed to Holland. In the sixteenth century, a coarse blue woollen fabric called shalloon, was a staple commodity in the commerce between Scotland and the Low Countries, Bruges in Flanders, and Middleburg in Holland being the entrepôts. Most of the Stirling merchants were engaged in the trade, and their apprentices, either during their apprenticeship or immediately on becoming journeymen were bound by the articles of their indenture to undertake two voyages to Holland as supercargo. On their return they would naturally detail to their home-keeping comrades all the wonders they had seen on their travels, dwelling especially on the warlike operations of William of Orange against the Spaniards in the Netherlands, and the brave doings of the Scotch contingent which in 1570 had enlisted under his banner. Young Edmond would, we can easily believe, be one of the most eager listeners to these wonderful stories, and so about the year 1579 or 80 he left his father's house and embarking in a Dutch pink either at the shore of Stirling or at Leith, he set sail for Holland to carve out his fortunes with his sword. With the Scots Brigade in the service of the States General of the Netherlands, first under the banner of William the Silent, and afterwards under that of his illustrious son, Prince Maurice, he is henceforth to be identified, sharing in all its good fortune and in its reverses, and steadily rising by his own merit alone from the humble position of a musketeer to the rank of a colonel. In 1585 he undoubtedly assisted in the determined but fruitless attempt to relieve Antwerp, then besieged by Alexander Farnese, Prince of Parma, and had his own share with other valiant Scots under Balfour, in the frightful struggle for the possession of the Kowenstyn Dyke. "'Twas an affair of the most brave obstinacy on both sides," says Parma, who rarely used strong language, "soldiers, citizens, and all, they were like mad bull dogs."

As I have already said, we shall only get a detailed account of Edmond's courage and gallantry when the history of the Scots Brigade from 1570 is written, but we get a glimpse of him in 1598—eighteen years after he had entered the service—as sharing Prince Maurice's victory at Turnhout, and as the fortunate means of saving his leader's life.

"The fight was almost done," says Motley in his *United Netherlands*, "when a small party of the States cavalry, who, at the beginning of the action had followed the enemy's horse, in its sudden retreat through the gap, came whirling back over the plain in wild confusion, pursued by about forty of the enemy's lancers. They swept past the spot where Maurice with not more than ten horsemen around him, was directing and watching the battle, and in vain the Prince threw himself in front of them, and strove to check their flight. They were panic-struck, and Maurice would have been swept from the field had not Marcellus Bax and Edmond, with half a dozen heavy troopers, come to the rescue."

At this point it may not be uninteresting to note the equipment of a company of infantry in the army of Prince Maurice, who, as is well known, was not only one of the most skilful commanders of the age, but by bringing science to bear upon military operations, completely revolutionised the whole system of warfare in Europe. To obtain a captain's commission in the Dutch service, it was at that time necessary to serve four years—a lieutenant's or ensign's—three. An infantry company consisted of 113 men, with captain, lieutenant, ensign and non-commissioned officers. Each company consisted of musketeers, harquebusseers, halberdiers, pikemen and buckler men. Long after portable fire-arms had come into use, the greater portion of foot soldiers continued to be armed with pikes, until the introduction of the fixed bayonet about the middle of the seventeenth century, enabled the musketeer to do likewise the duty of pikemen. Maurice was the first to appreciate the value and advantage of portable fire-arms, and in his companies 64 carried firelocks and 30 pikes and halberds. Two sorts of fire-arms were in use—musket and harquebus. The first was a long, heavy unmanageable weapon, which, when fired, was placed upon an iron fork or gaffle, which the soldier carried with him and stuck into the ground. The bullets were twelve to the pound. The harquebus or hookgun, so called because of the hook in front of the barrel, to give steadiness in firing, was much lighter than the musket, was discharged from the hand, and carried bullets of 24 to the pound. Both weapons were matchlocks. The pike was eighteen feet long. and pikemen and halberdiers carried rapiers. There were three buckler men in each company, originally introduced by Prince Maurice for the personal

protection of the leader. Such then was the "fighting gear" of the men under Colonel Edmond's command.

We now come to the famous battle on the Downs at Nieuport, fought on the 2d of July, 1600, in which he and his regiment of Scotchmen took a very prominent part. In the early part of the year the States General, in secret council assembled, determined to make a sudden and aggressive movement into the Spanish Netherlands, and with this view to land a large force at Nieuport on the coast of Flanders, to carry that important place by surprise or assault, if possible, and from that basis to attack Dunkirk, as the possession of these places, with Ostend—which the Republic had always held—would ensure the entire subjugation of Flanders. Prince Maurice, his cousin Lewis William Stadtholder of Friesland, one of the most sagacious military critics of the age, as well as Sir Francis Vere, leader of the English contingent in Dutch service, were all opposed to the expedition as fraught with the utmost danger to the Republic. But the States General had made up their minds, and there was no option but to obey. The rendezvous was at Castle Rammekins, near Flushing, at the mouth of the Scheldt, and here on the 19th June, 1600, gathered a magnificent force of 12,000 infantry and 1600 cavalry, the flower of the States army, all well paid, well clad, well armed, well disciplined veterans. They embarked in a large fleet of galleys and transports, which in modern times under steam would have accomplished the short passage of 35 miles across to Nieuport in a few hours. But a south-westerly wind blew for days, and Maurice fretting at the delay sent off his cousin, Ernest of Nassau, with a small force to prepare the way, crossed the Scheldt, disembarked his army at the Sas of Ghent and prepared to march by short stages overland. As soon as the troops were landed the vessels were sent off as expeditiously as possible, the transports being directed to proceed as fast as the wind could carry them in the direction of Nieuport. The march from the port of Ghent in a south-westerly direction towards Ostend, occupied till the 27th of June, on which day the important fort of Oudenberg was captured and strongly garrisoned, and other redoubts of the enemy in the neighbourhood of Ostend,—Breedene, Snaaskerk, Plassendaal—and the fort of St Albert on the Downs—were seized and garrisoned. The route now lay in

a southerly direction along the shore of the North Sea, and on the morning of the 1st of July the force crossed a little bridge over a stream at a place called Leffingen, arriving in the forenoon at Nieuport. This was a strong, well built, well fortified little city, situated a mile and a half from the coast, on a small tidal river or estuary, which at high water was sufficient to float vessels of a considerable burden. The haven was taken possession of by Maurice, and two-thirds of his army were thrown across to the western side, the troops on the eastern side being placed under the command of his young cousin, Prince Ernest. These details are necessary to explain the context.

Meanwhile the tidings of this bold invasion of Spanish territory reached the Cardinal Archduke Albert, who on his marriage to the Infanta Isabella, daughter of Philip of Spain, had been made Governor of the Netherland Provinces. He lost no time in making preparations, and by the 29th of June, a force of 10,000 foot and 2000 horse had assembled in the neighbourhood of Ghent. Marching quickly to the coast, in the very footsteps of Prince Maurice's army, he appeared before Fort Oudenberg, when not a soul in that fortress or in Ostend (where the States General had assembled) dreamed of an enemy within twenty miles. Oudenberg and the other redoubts taken by Maurice only two days before, were re-captured and the garrisons put to the sword, and all communications were cut off between Ostend and the Dutch army. News of the Archduke's advance was brought to the stadtholder by a straggler from Oudenberg, and Maurice at once recognised the critical character of his position. Motley says "the lesson to be derived both in military and naval warfare from the famous campaign at Nieuport does not depend for its value on the number of ships or soldiers engaged in the undertaking. Otherwise, and had it been a military expedition like a thousand others which have been made and forgotten, it would not now deserve a momentary attention. But the circumstances were such as to make the issue of the impending battle one of the most momentous in history. It was entirely possible that an overwhelming defeat of the republican forces, would bring with it an absolute destruction of the Republic, and place Spain once more in the possession of the "heretic" islands, from which she would menace the very ex-

istence of England more seriously than she had ever done before! Who could measure the consequences to Christendom of such a catastrophe?"

After anxious deliberation, it was determined to despatch Prince Ernest to seize the bridge at Leffingen, before the Archduke should reach the deep, dangerous, and marshy river over which it was the sole passage to the Downs. Two thousand infantry including the Scotch regiment under Edmond, four squadrons of cavalry, and two pieces of artillery composed the force. Marching as rapidly as the ground would permit, Ernest reached the bridge at eight o'clock on the morning of the 2d of July—a lovely summer morning giving promise of a day of more than ordinary heat—only to find it already occupied by Spanish troops. What course should he pursue? He had been sent to bar the Archduke's passage and he had failed. He determined to give battle, and took up his position behind a dyke upon which he planted his guns, forming his troops right across the enemy's path. On the right was Edmond with his regiment of Scots, on the left the Dutch infantry under Van der Noot, with four companies of riders. The passage from the stream to the Downs was not more than a hundred yards wide, with a swamp on either side. Here Ernest with his two thousand men awaited the onset of the Archduke's army. He was perfectly sure it was only a question of time, but the delay in the advance of the Spaniards—if his troops behaved as they had always done—would be invaluable to the main body of the army at the haven of Nieuport.

The Archduke paused, for he too could not be certain from the resolute front opposed to him, that he was not confronting the whole of the Dutch army. The doubt was of short duration, and the onset began. Ernest's Artillery fired four volleys into the advancing battalions, with such effect as to stagger them for a moment, but they soon afterwards poured over the dyke in overwhelming numbers, easily capturing the cannon. The attack began on the left, and the cavalry, thinking they should be cut off from all possibility of retreat, turned their backs, in the most disgraceful manner without waiting for the assault. Galloping round the infantry on the left, they infected the Hollanders with their own cowardice. Scarcely a moment before Van der Noot's regiment was running away as fast as the troopers, while the Scots on the right, hesitating for a moment, also broke and fled. Before the battle had began, one of these

hideous and unaccountable panics which sometimes break out like a moral pestilence to destroy all the virtue of an army, and to sweep away the best considered schemes of a general, had spread through Ernest's entire force. The Scots in an ecstacy of fear throwing away their arms as they fled, ran through the waters behind the dyke, skimmed over the sands at full speed, and literally drowned themselves in the sea. Almost every man of them was either slain or drowned. All the officers fought most gallantly, but in their efforts to rally their men, all the captains—Stuart, Barclay, Murray, Kilpatrick, Michael, Nisbet, with the rest of the company officers were killed. The rout was complete. The artillery and the standards, the baggage and ammunition, *everything* was lost. Dutch historians have attempted to minimise the defeat and to palliate the conduct of Ernest's troops, but Motley, whose account of the battle I have given, and who could have no bias either way, adds emphatically—"No viler panic, no more complete defeat was ever recorded."

Edmond with Prince Ernest escaped unhurt, but whether they rejoined the main body of the army at Nieuport, and shared in the magnificent victory of the afternoon of the same day is not stated. The battle of Nieuport proper was as stubbornly contested, as the preliminary skirmish of the morning had been the reverse and the defeat of the Spanish troops was decisive. When victory—after wavering long in the balance—was at last decided in his favour, Prince Maurice dismounted from his horse, threw himself on his knees in the sand, and with streaming eyes and uplifted hands exclaimed, "Oh God! what are we human creatures to whom Thou hast brought such honour, and to whom Thou hast vouchsafed such victory?"

In 1603 Edmond returned to Scotland, and to his native town, where the fame of his achievements had already preceded him. It was determined to give him a public reception on his arrival, and accordingly the Magistrates at the head of the Corporations met him at the splendid newly erected east port of the town—the silver keys of which are still in possession of the Town Council—and conducted him with much rejoicing to the home of his boyhood in the Baxter Wynd. Much had passed in the interval, and we can better imagine than describe his meeting with his aged parents. All classes in the town vied in doing him honour. The Earl of Mar, High Treasurer of Scotland, invited

him to a grand banquet in the Castle, but he declined to attend unless his father and mother were included in the invitation. The Earl courteously acceded to this expressed wish, and the aged couple when they arrived with their son, were installed with all due ceremony in the place of honour at the feast. This little story is quite in keeping with another related by Sir Robert Sibbald to the effect that one day when on parade with several military officers of rank, Edmond was accosted by a stranger, who professed to have newly come from Scotland where he left the Colonel's relatives well, enumerating several of high rank. Edmond indignantly cut him short, and turning to his friends informed them—if they did not already know—that he had the honour—of which he should ever be proud—of being the son of a humble baker and freeman of the ancient burgh of Stirling. By the Earl of Mar he was at this time introduced to Prince Henry, eldest son of King James VI., who was then prosecuting his studies in Stirling Castle. Prince Henry, who was a lad of exceeding promise, had early shown a passion for arms and for the society of men of that profession. He maintained a correspondence with Colonel Edmond and after the latter had returned to Holland, models of the newest armour and all the military engines used in the wars and sieges there were forwarded by him to the Prince. During Edmond's stay in Stirling the erection of a manse for the first minister of the parish was in contemplation by the citizens. Bazaars were as yet in the far distant future, so with a view of providing the necessary funds a supplementary collection-plate was placed at the church door on Sundays, called the 'reparation' plate. Contributions were probably coming in slowly when Col. Edmonds, it may be as some sort of expiation for his youthful delinquency, came forward and made up the requisite sum. In grateful acknowledgement of his generous kindness, and in graceful recognition of his father's position, the bakers' arms were sculptured on the building.

The manse, a handsome turreted structure, stood at the north-east end of the church, between Broad Street and St John Street. When Captain Sutherland wrote his "History of Stirling" in 1808, the building was in a very dilapidated condition, and it was finally pulled down in 1824, having stood 221 years.

From the above excellent little work, the MS. of which, in Captain Sutherland's own handwriting,

was kindly lent me by his daughter, Mrs Angus, Queen Street, it would appear that there is some connection between the Blue Blanket or Banner of the Seven Incorporated Trades of Stirling and Col. Edmond. The following is the passage as it occurs in the MS.:—

"The Blue Blanket is kept in an old chest, having 7 locks, and each Deacon of the Trades has a key, but its history and origin are lost. But some light may be thrown on it by the circumstance that Colonel Edmond gave in 1603 a stand of colour to the Trades, and although I have never seen the Blue Blanket, it is conjectured that this is the very colour given by him. It is of very fine silk, with 14 stripes, red and white alternately, with the Scottish Cross of Andrew in the centre. Whether it is a standard taken from the Spaniards, or a flag of the Prince of Orange, the difficulty of seeing it precludes from distinctly mentioning."

In 1604 or 1605 Colonel Edmond left Scotland, never, alas! to return, and rejoined his regiment in Holland. He took part in the campaign of 1606, and it was probably during this year that the incident occurred which Sir Thomas Urquhart refers to in his *Ekskybalauron*, when he contrasts the "famous Scottish Colonels," exceedingly renowned "for their fidelity, valour, and gallantry all over France, Spain, the Low Countries, &c., with the 'fresh-water kirk-officers' so plentiful in the Scotch civil war." "The gold and silver treasure of the Indies," says Sir Thomas, "not being able to purchase all the affections of Scotland, for the furtherance of Castilian designs, there have been of late several Scottish Colonels under the command of the Prince of Orange, in opposition to the Spagniard, viz., Colonel Edmond, who took the valiant Count Bucooy twice prisoner in the field, &c."

The same story appears in another form in a quaint old book, "A History of the Blue Blanket or Craftsman's Banner of Edinburgh," written by Alexander Pennicuick, Burgess and Guild Brother there, and published by Mossman & Co. in 1722.

"I cannot omit," says Pennicuick, "to hint at the beautiful story of Mr Edmond, a baxter, and the son of a baxter in Stirling, who showed such unparalleled valour in the Swedish wars under the conduct of that Imperial Thunderbolt of War, Gustavus Adolphus, that he became a general. His swimming the Danube, and the carrying off the General of the Imperialists, and other marvellous 'records' of his life, are recorded in the chronicles

of Sweden. In his old age he returned to his native Scotland, and built a stately manse in his native town of Stirling, which he doted to the church."

The worthy burgess has got rather "mixed" in his facts. If we substitute the Waal or the Yssel for the Danube, and the Dutch for the Swedish wars, we shall probably come nearer the exact truth. It is evident, however, that Edmond's attempt must have been as bold and daring as it was successful, to have made such an impression. The Count de Bucquoy was one of Spinola's ablest officers, and a most accomplished strategist. He graduated in arms at the famous siege of Ostend in 1601-3. Thenceforth his name comes prominently forward in all military operations in the Netherlands for the next few years, and in the campaign of 1606 he was second in command to Spinola himself.

In the middle of August, 1606, Spinola laid siege to Rheinberg, a town on the Brandenburg frontier about 35 miles north-west of Berlin. It had been taken and retaken so often in the course of the wars that Motley sarcastically observes that "its inhabitants must have learned to consider themselves rather as a circulating medium for military purposes, than as burghers having any part in the ordinary business of life." It had old-fashioned defences of stone, which during its recent occupation by the States, had been much improved by earthworks. The garrison numbered 3000 effective men under the command of Prince Frederick Henry, William the Silent's youngest son. Col. Edmond was entrusted with the command of one of the forts on the line of defence, and Sutherland tells us that he had on this occasion fifty Frenchmen of distinction serving under him to learn the art of war. This statement is corroborated by Motley, who states that "the Prince de Soubise, son of the Duc de Rohan, and other French volunteers of quality, also threw themselves into the place to learn the latest methods of attack and defence." Here—the precise date is uncertain—while reviewing his entrenchments, Edmond was killed by a cannon ball, and his men, dispirited by his loss, evacuated the fort that same night and retired into the town, which finally surrendered to Spinola on the 2d of October.

And so he died. At his post fighting valiantly. The very death, I think, he would have chosen had choice been granted him. A brave and gallant soldier—a modest, upright, true-hearted, Christian

gentleman—a noble "Son of the Rock," of whom Stirling may well be proud.

Nimmo, in his "History of Stirlingshire," quoting from Douglas's "Peerage," says that Colonel Edmend's daughter married Sir Thomas Livingston of Jerviswood, a cadet of the noble house of Kilsyth, and of the noble and more ancient family of Livingston of Linlithgow and Callendar. Her eldest son, Sir Thomas Livingston, colonel of a regiment of Dragoons, a Privy Councillor, and Commander-in-Chief in Scotland, was by William III., in 1698, created Lord Viscount Teviot by patent to male descendants. He died without issue in 1711, and the peerage became extinct.

List of Authorities.—Local Histories, Chambers, Randall, Rev. Dr Rogers, Captain Sutherland's M.S.; Nimmo's History of Stirlingshire, 2d Edition; Statistical Account of Stirlingshire, 1842; Histories of Scotland by John Hill Burton and Tyler; Scottish Review, 1884; Motley's Dutch Republic, Motley's United Netherlands, &c.; Watson's Philip of Spain.

On Tuesday, 4th May, the usual monthly meeting of the above Society was held in the Smith Institute, There was a good attendance of members. Dr Galbraith, in the absence of the Rev. W. F. Goldie, vice-president, occupied the chair. Two papers were read, the first by Mr David Bruce, Victoria Square, on "The Redwing," a species of thrush commonly found in the Back Walk in winter; and the other by Mr Alex. Moyes, Head Master, Elementary High School, on "The Geology of the Castle Rock." Mr Bruce's paper evoked some discussion, from which it appeared that the distinctive features of the Redwing, as distinguished from the ordinary song thrush, which is taken as the type of the genus, are a deeper orange tinge below the wings, a whiter and more uniformly coloured breast, and a white streak over the eye. There was no difficulty in recognising the bird here, in winter, when it was among us. In answer to a question, Mr Bruce stated that thrushes are classed third and fourth among birds in Europe and America, because of their complicated larynx, their more perfect foot, and wings. Very good specimens of the ordinary song thrush, and of the Redwing, with its wings closed and extended, were exhibited for the benefit of the members. ‖

NOTES ON THE REDWING.

Having been asked by some members of your council to prepare a few notes on a bird which appeared in considerable numbers in our Back Walk early in February last, and which suffered severely by the protracted storm of frost and snow we had then, I have endeavoured to meet their wishes in the following short paper:—Our subject then is the Redwing, technically called 'Turdus illiacus.' The term Turdus is taken from the Latin classics, used there denoting a bird of the thrush kind, the derivation of the word unknown. The specific name Illiacus is derived from Illia, relating to the flank, and is supposed to have been given it by Linnæus, as characteristic of the conspicuous light red patch on its flanks and lower wing coverts. The Genus Turdus—the true or typical thrushes—may be said to be cosmopolitan and numbers at present about 150 species. We have in this country three species common residents, the missel thrush, the song thrush, and the blackbird; two as winter visitors, the redwing and fieldfare; one a summer migrant, the ring-ouzel; and four others—the American robin, the black-throated thrush, White's thrush, and the Siberian thrush—which can only be considered rare accidental stragglers. In the modern classification of birds, naturalists (spurred by the theory of evolution to examine more closely their structure) generally have come to consider this family the most highly specialized form, hence the place of honour is usually now assigned to the thrushes by placing them at the head of the series instead of as formerly the vultures, the eagles and other rapacious birds. The subject of our paper stands at present the third in the list of European birds and the fourth in the list of the birds of North America. The redwing has a very wide range both in its summer and winter quarters. In the former it is found to extend from North-Eastern Siberia, through all intervening countries, about the same latitude, westward to Greenland, and here I may mention it is only because it is found in Greenland that gives it a place in the list of American birds, having never been found in North America proper. In the south its winter range is equally extensive, for beginning again from the east it is found in the North-Western Himalayas, round the Caspian Sea, in Constantinople, common in Greece and its Islands, and though it does not seem to cross the eastern end of the Mediterranean, it is a common visitor in Algeria. It has also been met with in Madeira, the Canary Islands, and the Azores; while in Portugal and Spain it is abundant at certain seasons, as indeed may be said of it in every country of Europe. This bird then is a regular winter visitor to the British Islands, coming to us in flocks from Iceland and the northern parts of the European continent; ar-

riving about the end of October, and leaving us for its northern home about the end of April. Regarding its habits while in this country, it chiefly affects enclosures and parks that are ornamented with clumps of trees, and like the song thrush (which it much resembles in external appearance) it seeks its subsistence in mild and open weather in pasture lands and moist meadows, feeding principally on worms, snails, slugs, and insects. It is much less inclined to eat berries than most of the other species of this genus, and should its usual resources be closed by long continued frost and snow, the redwing is the first among birds to suffer. While with us, their common note is a rather harsh scream, but in fine weather they often, while perched on the trees, sing in a very pleasing manner, with a subdued voice, but they never sing with us as to exert their whole vocal powers. Their habits in their nesting haunts, naturalist travellers in Norway tell us that, unlike the fieldfare, which nests in colonies, the redwing is solitary, each pair building alone in their part of the wood. The nest is placed on bushes or low trees, but in the barren, treeless portion of the west coast of that country, it is often placed on the ground, between stones, or on fences, or on the stunted birches. In Iceland, where it is the only thrush, and where there is scarcely any wood except the birch tree, and that stunted to the merest dwarf, the nest is very frequently found on those birches over-hanging rocky ground, and often upon a bare ledge of rock like that of the ring-ouzel, which frequents similar desert wilds. The nest of this bird is in all respects very similar to that of our blackbird, as also the eggs, which are usually five in number, sometimes, though rarely, six. It frequently has two broods in a season. Respecting the song of this bird in its native wilds, very many differing opinions have been given; many conflicting estimates as to its quality and execution have been made. As an industrious musician, there can be no question, for Mr A. C. Chapman, who visited Lapland on a bird-nesting expedition last year, gives us the following from his diary:—"June 20. As we lay in the tent, we made notes of the nocturnal bird songs. For about half an hour at midnight, though the sun shone brilliantly in a yellow sky, all was hushed, and the first bird to break the silence was the redwing followed immediately by the brambling, and then the smaller warblers joined the chorus." Linnæus in the account of his tour in Lapland, terms the redwing's song 'delightful,' and adds, that 'its lofty and varied notes rival those of the nightingale herself.' Many subsequent authors repeated this statement of Linnæus, and which we have good reasons to believe to be extravagant. We have now the opinion of Professor Newton, who, in company with the accomplished Mr Wolley, visited the far north and often heard this bird, also that of Mr Dresser author of

"The Birds of Europe," who was acquainted with it in the north of Finland, and other capable judges who all agree in describing the song as 'a string of three or four loud mellow notes resembling trui-trui-trui uttered at about the ordinary pitch of the voice of the song thrush, but in a regularly descending scale, followed by a little twittering or warbling so faint and feeble as only to be heard at a short distance. The constant repetition of this strain,' adds Professor Newton, 'though a striking woodland sound becomes tiresome; and in a land (referring to Lapland) which re-echoes the melody of the song thrush and blue-throat, the name of nightingale applied to the redwing seems ironical." It is therefore safe to say the redwing is not the accomplished songster once believed; his song being of the stereotyped class, familiar examples of which we have in the chaffinch, hedge sparrow, yellow hammer, and the whitethroat, their songs being constantly composed of the same notes, and which are always produced in the same order or sequence; a class of birds poets have taken little notice of. Poets have reserved their praise for those which seemingly vary their notes according to their momentary mood, as the nightingale, song thrush, skylark, woodlark, and, amongst finches, the grey linnet. Still in Iceland, where the redwing has no rival, we may be sure his advent there will be hailed with delight as the precursor of brighter days; and when his loud wild notes are first heard, the Icelander may express his joyful feeling in the words (slightly varied) of the eastern monarch's love song. Lo, the winter is past, the reign of the ice-king is over and gone, the flowers appear on the earth, and the time of the singing of the birds is come.

NOTES ON THE GEOLOGY OF THE CASTLE ROCK.

The rock on which Stirling Castle stands is interesting for many reasons: its commanding situation—the key to the north; the magnificent views to be had from its summit; and the many historical scenes which have made it and its neighbourhood famous. None the less is it interesting when we pass from the record of man's deeds around to ask it to tell us something of nature's workings with it. In bringing under your consideration to-night the results of some inquiries about the geology of the Castle rock, I am quite aware that the treatment of the subject is somewhat faulty, and is mainly an arraying of some elementary facts with which many of you must be familiar. It seems necessary, however, to make a record of what is known. It is with that purpose in view that the following notes have been written. They may serve as a basis to which

those possessing fuller knowledge may add. Looking from the north-west a series of lofty escarpments present themselves to view. On the right the Touch Hills rise in the peculiar terraces characteristic of trap hills. Further to the east and south appears the long line of the Murrayshall cliffs, cut in two by a great fault, across which the road passes between the farms of Greystale and Wallstale. This line of cliffs is continued, though at a lower level, by the rocks in the King's Park. Eastwards and a little to the north, standing clear and towering high the Castle rock is seen in great prominence, and still further east and north the Abbey Craig. A little to the north west and in line with the escarpment of the Touch Hills, lies another eminence, not so high, but still prominent, Craigforth. These escarpments are all formed of igneous rock, but in them we have two divisions of eruptive rocks. The material now forming the Touch Hills and Craigforth issuing from the interior of the earth in a molten state, flowed over the surface as lava, and was contemporaneous with, being sometimes interbedded with, the strata of the calciferous sandstone series. They are true volcanic rocks. On the other hand, the material forming the rocks at Murrayshall, the Castle, and the Abbey Craig, although likewise issuing from fissures in the crust of the earth in a molten state, never reached the surface while in that state, but consolidated at a greater or less depth beneath it. They are intrusive rocks, having been forced between the strata among which they are now found. The term "subsequent" is sometimes used in connection with rocks of this kind to distinguish them from contemporaneously formed rocks, as they have been formed at a period later than those rocks among which they are found. The term "plutonic" is also used. The Touch Hills and Craigforth are thus formed of the rocks which are volcanic, interbedded or contemporaneous, while the Castle rock, which is now revealed at the surface only after the removal of a depth of overlying rock, is plutonic, intrusive, or subsequent. Not only do these two divisions of rocks differ in their mode of occurrence and consolidation, they also differ in their structure. The rocks of the Touch Hills are porphyritic; that is they are chiefly composed of a compact or finely-crystalline ground mass, through which large distinct crystals are dispersed. They are also much older than the Castle rock, having been formed at the beginning of the carboniferous period while the Castle rock

cannot well be older than the latest (most recent) carboniferous times. The Castle rock is formed of dolerite one of the varieties of the basalt series of rocks. The term greenstone was formerly applied. It is a distinctly crystalline rock, the component crystals being usually large enough to be readily distinguished by the naked eye. Of its microscopic structure and the minerals composing it I shall have to speak further on. I have already remarked that the rock is probably of later carboniferous age. It forms part of an extensive sheet of intruded rock which may be traced from Denny northwards. It is very difficult to tell the exact period to which these intrusive rocks belong, as they pass between strata that have been already formed. Dr Geikie, quoting from Mr Peach, who surveyed and described the district, says, "These masses have been intruded among the carboniferous limestone series of strata probably at a time before the consolidation and disturbance of these strata, seeing that they have been faulted and bent together with them. These belong to an extensive belt of intruded matter, which, keeping not far from the base of the carboniferous limestone series, extends to near the end of the County of Fife, and forms in its course the prominent eminences of the Cleish, Lomond, and Ceres Hills. We cannot be quite sure of the dates of these masses, some of them no doubt belong to the volcanic phenomena of the carboniferous period, but some may be post-carboniferous and even tertiary." The castle rock is in all ikelihood one of those which "no doubt belong to the volcanic phenomena of the carboniferous period." Although the nature of the rock could be determined from its general appearance and microscopic structure, it is interesting to find evidence which confirms the conclusions that would be arrived at from such an examination. This evidence we have on the north-west of the Castle, where the outcrop of the strata of the carboniferous limestone is distinctly seen at the side of the footpath leading from the Ballengeich Road to the skating pond. These strata consist of beds of shale sandstone and limestone. The shale is very friable, owing to the extensive weathering through long exposure to the atmosphere. These beds dip under the Castle at a considerable angle, the direction of their dip being from N.W. to S.E. (nearly.) The actual contact of the erupted rock with the sedimentary strata underlying it is seen immediately to the east of the Ballengeich, where I suppose the school-

boys of Stirling have for generations gathered the "caum," as they call the burnt and altered shale. It was formerly seen, I believe, at the entrance to the Ballengeich, but the rapid weathering of the rock at this point has covered this interesting section with debris. A record of this important point has fortunately been made by a distinguished geologist of former days, Dr M'Culloch, who described and figured what he saw. His account appears in the Transactions of the Geological Society for 1814, and is headed "On the Junction of Trap and Sandstone at Stirling Castle." He remarks, "It was in cutting a new road through the Castle Hill that the appearance in question was laid bare. He further says, "On inspecting the drawing it will be seen that the sandstone stratum has been split into two parts in the direction of its stratification. The upper portion is then separated by a perpendicular fracture and bent upwards, terminating abruptly. It is in this position involved, supported, and covered by the greenstone. The broken end is irregularly fractured, but all its cavities are perfectly filled up with greenstone." He describes the trap at the point of contact with the sedimentary rocks as "of a dark blueish black compact greenstone." This exactly describes a specimen taken from the point of junction further to the east still to be seen. At the risk of seeming tedious in my repetition, I again revert to the origin of the dolerite of the Castle rock. Originally a molten mass it came from the interior of the earth through some fissure or fissures in the earth's crust. Its eruption may have taken place during the earlier stages of volcanic action before communication had been established with the surface, or towards the close when the vents having been choked up with erupted material, escape to the surface became difficult. Whatever the reason may have been this molten mass never reached the surface, but finding its path of least resistance to lie along the bedding planes of the strata of the carboniferous limestone series of rocks it thrust itself between the beds, raising up the overlying mass, and gradually consolidated as a nearly parallel cake or sheet. It did not, however, remain between the same beds of rock throughout the whole length of the intrusive sheet. At several points it has broken across the strata and passed along beds usually at a higher level. In many respects this intruding mass of molten matter resembled the flow of lava along the earth's surface, but there are certain characters which mark

it at once as intrusive. I have already incidentally referred to these distinctive features, but for the sake of greater clearness it may be well to bring them together, so that our proof may be complete. 1st, Intrusive rocks are usually most close-grained at their upper and under surfaces, and most coarsely crystalline in the central portions. The upper surface of the Castle rock as originally formed has been removed ages ago, but its under surface, as may be seen from the specimens exhibited, shows this finely-crystalline structure, and the further from the point of contact the larger are the crystals. 2d, Another marked feature of intrusive rocks is that they catch up and involve portions of the surrounding rocks. I have already quoted from Dr M'Culloch's record of an instance of this in connection with the Castle rock. 3d, The third feature of intrusive sheets is the one I have lately referred to. They do not conform to the bedding of the rocks through which they pass, but break up through the strata, and pass along another line of stratification. In its molten state the rock would be very different from what we see it. It would probably be without structure of any kind. It sometimes happens that the igneous mass, having been suddenly congealed along its line of contact with the surrounding rocks, solidifies exactly in the structureless state in which it had issued from the earth. Dr Geikie says that the glassy type was the original condition of most, if not all, eruptive rocks. As a rule, however, the rock cooled slowly, quicker of course when in contact with the underlying strata than at a distance from it. This cooling set up a process of crystallisation, and here and there throughout the mass crystals began to appear. As the cooling continued, more crystals were formed, until at last the whole mass became quite cold and solid. Usually the felspar crystals formed first, as they are found surrounded and enclosed by the other crystals forming the rock. One other point to be noticed is that when cooling takes place quickly, the crystals formed are small, and on the other hand large when the cooling is very gradual. Thus it is seen that near the cooling surface the rock is fine grained, that is, composed of small crystals, while the further from the point of contact the crystals are larger. This accounts to a large extent for the great variety of texture in the specimens exhibited, although no doubt pressure also exercised a considerable influence on crystallization. While this process of cooling and crystallizing was going

on, the rock was gradually contracting. This contraction has taken place along distinct lines at right angles to the cooling surfaces. The effect of contraction has been to produce columns of varying size. This columnar or prismatic structure is seen very distinctly all over the Castle rock. Mr Peach, of the Geological Survey, to whom I am greatly indebted for much of my information about the geology of the Castle rock, has very kindly made a sketch of a part of the Back Walk, above the Skating Ponds, where this is well seen. The sketch is so faithful that I have no doubt you will at once recognise the spot. In nearly every exposure, these lines of contraction or joints, as they are termed, may be distinctly noticed. There are most commonly two chief sets of joints—"master joints" they are termed—which intersect, and thus divide the rock into long columns. A third set of joints may usually be noticed cutting across the columns. This third set is, however, not so persistent as the others. When these cross-cutting joints are absent, columns of many feet in length may be seen. The three sets of joints I have spoken of are quite easily recognised in the sketch of part of the Back Walk. Considerable discussion has arisen as to the mode in which this columnar structure has been produced. Dr Geikie, quoting from the "Proceedings of the Royal Society, January, 1875," says, "Mr Mallet concludes that all the salient phenomena of the prismatic and jointed structure of basalt can be accounted for upon the admitted laws of cooling, and contraction thereby of melted rock possessing the known properties of basalt, the essential conditions being a very general uniformity of material in the mass cooling, and that the cooling shall take place slowly principally from one or more of its surfaces." Closely connected with the prismatic structure of the rock is its peculiar weathering. It might be safely said that all parts of the rock which have been exposed to the action of the atmosphere for any length of time are more or less weathered. This is chiefly due to the solvent influence of rain, which in its passage through the atmosphere absorbs a considerable quantity of carbonic acid. The distinctive feature of the weathering in the Castle rock, as in all prismatic massive rocks, is its tendency to exfoliate into concentric onion-like coats. This is well seen in almost any exposed surface of the rock, but perhaps the most rapid disintegration is taking place in the neighbourhood of the Ballengeich. In this particular part of the

rock a good deal of movement has taken place. It may be detected by the broken and shattered appearance of the rock as well as the slicken-siding where the rocks have been crushed and polished as they rubbed against each other. This crushing may have opened more numerous channels for the percolation of water, and thus hastened the decay of the rock. Coming now to the general appearance of the Castle rock — the Crag and Tail as it has been sometimes named (the nature of which is very faithfully shown in the sketches which Mr Kidston has very kindly made) it would seem that the present aspect of the rock has arisen from two causes—the dip of the beds which underlie the rock, and the removal of an immense thickness of the overlying and surrounding strata. When first formed, no part of our Castle rock would be visible at the surface. It would be overtopped and surrounded by the strata of the carboniferous limestone series, among which it had been intruded, and also most probably by the strata of the coal measures. Professor James Geikie of Edinburgh University, in a lecture on the Geology of Scotland, made some remarks on denudation which will more clearly describe what has happened than any words of mine. He said, "In all countries composed of undulating and folded strata which have been for long ages exposed to the action of the eroding agents, the ultimate form assumed by the ground is directly dependent on the character of the rocks and their structural peculiarities. Thus, in regions like the neighbourhood of Edinburgh (and we may add the neighbourhood of Stirling), those rocks which best resisted the action of denuding agents have come to form hills, simply because the softer or more readily eroded strata by which they were previously surrounded, had been gradually removed. Thus the Castle rock, the Calton Hill (I might substitute for these our Castle rock and the Abbey Craig), and every prominent hill within view of the city were formerly deeply buried under great thicknesses of rock which long ago had been carried gradually away. It was just because those hills consisted of harder rock that they had not been cut down to the general level of the rolling ground above which they now projected." Denudation alone, however, would not account for the peculiar features of our Castle rock, but taken along with the dip of the rocks beneath it, we get the explanation. These strata dip from N.W. to S.E. (nearly) passing under the Castle at a considerable angle.

The cliffs at the Castle thus owe their height, not so much to the greater thickness of intruded matter as to the fact that they are elevated on the highest points now remaining of the beds which underlie them. At the quarry in Barnton Street there may probably be a greater thickness of the intruded rock, while at the Craigs we may reach a much higher level of the original intrusive rock than at the Castle itself. The jointing and columnar structure of the dolerite has preserved the precipitous face of the cliffs on the N. W. side, the rock there not crumbling so much as falling away in great blocks through the action of frost and rain. Before speaking of the structure of the rock as revealed by the microscope, let me explain the plan adopted in following out this method of examination. The first step is to have a small piece of the rock made so thin as to be perfectly transparent. By rubbing it with emery on a piece of plate glass, and honing on a Water of Ayr stone, the section of rock may be reduced to the requisite thinness. We will now be able to examine it with the microscope, and with the aid of the polariscope gain a knowledge of its component minerals. A word or two on the polariscope may be of interest. It is made up of two similar blocks of Iceland spar or Nicol's prisms, as they are called. One of these is fitted above the object to be looked at, and the other below it. If the object be quite amorphous, as, for instance, a piece of glass, no change will be noticed when the prisms remain with their sherter diagonals coinciding, the light will pass through as if no prisms intervened. On turning the lower prism, however, the light will begin to fade until we reach a point at which no light at all will pass through. All amorphous or singly refracting substances will act in this way. If, however, when the Nicols are crossed (as they are said to be when no light passes) we place a section of rock between them, the crystals of which it is made up will so modify the polarised light that the field no longer remains dark but flashes and bands of many colours are seen. It is evident that we may readily tell by this means whether or not a rock contains any glassy constituent. If it does then that portion of its mass will become dark when the prisms are crossed, while the crystalline parts, which in the vast majority of cases do not belong to the singly refracting system, will remain conspicuous by their brightness. Examining a thin section of the Castle rock in this way we find that its great bulk is formed of crystals.

There is little or no glassy matrix. The most abundant crystals are felspars, next to those come the angites, while occasionally a crystal of olivine may be detected, small dark grains are noticed scattered through the other crystals. These may be titaniferous iron or magnetite Often too clusters of the needle-like crystals of apatite are met with. It must not be thought that every section will show exactly the same features as I have described. Indeed the various sections exhibit great variety, differing according as they have been taken from the rock near its contact with the shale, or at a distance from it. The whole subject of the mineralogy of the rock requires more careful treatment and description than I am able to give it, and I merely point out a field for investigation. These notes would not be complete without a short reference to the surface geology. Around the base of the Rock on the N.W. the soil is chiefly composed of the weathered fragments of the underlying strata of the carboniferous limestone mixed with debris from the dolerite. Scattered here and there are large boulders which have fallen from the cliffs above. Beyond the lower foot-path leading to the Raploch and reaching over to the King's Park lie the sands and gravels of the 100 ft. raised beach. On the top of the hills above Ballangeich the boulder clay lies. To what extent, however, I am not able to say. In the portion noticed are numerous stones which have come from Ben Ledi and the Callander district. Dr Geikie remarks of such stones "that they have a characteristic form and surface. They are usually oblong, have one or more flat sides or 'soles,' are smoothed or polished, and have their edges worn round. Where they consist of a fine-grained enduring rock, they are almost invariably found to be striated, the striæ running on the whole with the long axis of the stone. These marks have been produced by the friction of stones and grains of sand, as the whole mass of debris was being steadily pushed on in one general direction." Glacial striæ are, I believe, to be seen on the rock itself, the best examples being those within the burial ground of Mr William Drummond.

In conclusion, allow me once again to express my indebtedness to Mr Peach for his kindness in preparing the sketch and diagram, and for much information given on the ground, and to Mr Kidston for his sketches and valuable assistance in the preparation of these notes. I am quite aware that they come far short of a clear exposition of the story of the Castle

rock, but I trust some information may have been given which may incite to further study of the subject.

On Mr Moyes' paper some discussion took place. In answer to Mr Shearer, who asked what truth there was in the common belief that Craigforth was largely composed of ironstone, Mr R. Kidston stated that iron did exist in Craigforth, but in such small proportions that it would not pay the expense of working. Mr Kidston also stated that the rocks of which Salisbury Crags were formed were the same as those at the back of the Castle, but that owing to the presence of iron in the crystals, the junction of the shale and trap could not be so easily seen under the microscope. In fact, the rocks at Stirling were among the best specimens of this formation. The following sketches, specimens, and sections were exhibited:—

Sketches.—Two sketches by Mr Kidston, showing from different points of view the phenemena of crag and tail, as seen in the Castle rock, Abbey Craig, and Craigforth. Sketch by Mr Peach showing the jointing and columnar structure as well as spheroidal weathering of the rock.

Rock Specimens.—(1) Porphyrite from Touch Hills. (2) Dolerite with large crystals from rock taken from the Cemetery. (3) Do., but Felspar crystals of a reddish colour due to iron. (4) Dolerite from above junction of trap and shale agreeing with Dr M'Culloch's description. (5) From the same locality, but about four feet from the junction. (6) Showing actual junction of dolerite and sedimentary rocks. (6a) Dolerite with portion of shale caught up. (7) Shale burnt and altered from beneath the trap with plant remains. (8) Nodule rendered highly crystalline through heat from overlying traps. (9) Showing spheroidal weathering and columnar structure in a very small scale. (10) Showing exfoliation in concentric rings. (11) Dolerite slickensided and serpentinised. (11a) Felspar from segregation vein in Back Walk. (12) Stones smoothed and striated from boulder clay.

Microscopic Sections.—(1) Dolerite with large crystal rock specimen, from N.W. corner of Castle. (2) Do., with large crystal and reddish felspars from rock specimen No. 3. (3) Do., Fine grained, from junction of trap and shale—agreeing with rock specimen No. 4. (4) Shows actual junction of part and shale as in rock specimen No. 6. (5) Sections from felspar vein *(Labradonite)* in walk leading from Snowdon House to Royal Gardens, agreeing with 11a.

Diagram and Maps.—Diagram showing three lines of section. The lowest of the three is intended to represent the Castle rock and its surroundings. It passes from N. W. to S. E. through Craigforth and the Castle. On the right are the strata of the calciferous sandstone age lying on the old red sandstone; following these the lavas and ashes of the lower carboniferous age forming Craigforth (in part covered by clay of the carse), then the carb. lime series with the intruded Castle rock, and on the extreme left the upper strata of the carboniferous limestone series with Bannockburn coal. The second section passes from W. to E. across the Touch hills and the Castle. On the right is the lower old red sandstone,

then the calciferous sandstone group; next the lavas and ashes of the Touch hills, the carb. lime series, with Murrayshall limestone, and the intruded dolerite of the Castle. The third section is intended to show the probable amount of denudation that has taken place before the rock has attained its present outline. The maps are those of the Geological Survey; one on the scale of six inches to the mile, and the others one inch to the mile. They do not require description; the explanations of the colours and marks are found on them.

The monthly meeting of this society was held in the Smith Institute on Tuesday, 1st June—the Rev. Mr Goldie presiding. Three papers were read, one by the Rev. J. E. H. Thomson on "The Mammit King"; a second by Mr Gilbert M'Dougall, on certain "Gall producing Insects"; and a third by Miss Colvin, on behalf of Miss M'Lagan, Ravenscroft, on "Ancient Brochs in the immediate neighbourhood of Stirling." On the motion of Dr Drew, it was resolved to arrange an excursion of the society to the "Temple," one of the "brochs" referred to by Miss M'Lagan, which is situated on one of the slopes of the Gillies' Hill. The matter was referred to the council to fix the day and to make all necessary arrangements. Votes of thanks to Miss M'Lagan, to Rev. Mr Thomson, and to Mr M'Dougall for their interesting papers, and to Rev. Mr Goldie for his conduct in the chair, concluded the business.

THE MAMMET KING.

Most of us are aware that in pre-Reformation days there stood nearly on the site of the present Post-Office a Monastery of the Dominicans. This order, as all are aware, was due to the strange burst of fervour which illustrated the twelfth and thirteenth centuries that sent some away to Palestine to fight the Saracens, and others into monasteries to combat Satan. New forms of monastic self-repression were demanded to occupy the new-found zeal of these devotees, and so the two orders of preaching friars arose in the beginning of the thirteenth century, and after proving in some respects a great blessing, they became in the fourteenth century a curse and a nuisance, so that Wiclif was roused against them. Their spread was rapid; and before the thirteenth century was done both orders had reached Scotland. The Franciscans had their Monastery near the Castle, and its Chapel, the former Church of the Holy Rood, still remains. The Dominicans had their Monastery, as we have said, near where the present Post-Office stands. Unlike

the church of the rival order, the church of the Dominicans has utterly disappeared, more entirely even than that of the Augustinians at Cambuskenneth. It had proved much too handy a quarry to be left standing when it ceased to be used for worship. Possibly Mar's Work contains part of its remains. Councillor Thomson told me he remembers when the last fragment of its wall was taken down a year or two ago, when Bailie MacEwen was pulling down some old houses in Port Street to make way for his stores, as most of you will remember, a quantity of old carved stone work was uncovered, much too finely carved for the place where it was found. Not improbably these stones, too, had formed part of the sacred edifice in question. The fragments were too slight to enable any one but a perfect Cuvier in art to have more than guessed the architecture of the structure from all that came down to us. It likely was an early pointed building with Norman elements in it. It is not, however, so much with the Monastery or the Church that I should like to occupy the present meeting of the Natural History and Archæological Society, as with a tomb that stood on the north side of the great altar. There is a manuscript in the Advocates' Library, Edinburgh, written by some unknown author, in which we have the inscription on this tomb given in full :—

"Anglise Ricardus jacet hic rex ipse sepultur
Loncaste quem dux dejicit arte moto prodicione
Prodisione potens sceptre potilus iniquo
Supplicium luit nunc ipsius omne genus
Ricardum inferis nunc Scotia sustulit annis
Qui caustro Striveling vita peregit iter
Anno mileno quater ceno quoque deno
Et nono Christi regis finis fuit iste."

Which may be rendered without greater ruggedness than makes it a fit version of the original :—

"Here lieth Richard, who was England's King,
O'erthrown by treachery of Lancaster,
Who, strong by treason, gained a wrongful throne.
Richard died childless, and his later years
In exile spent, by Scottish bounty fed,
By Stirling's castled steep his life's sad course
Ended, when since the year of Jesus birth
'Twas fourteen centuries and ninteen years."

Hector Boece also mentions having seen this epitaph. Further, Boece, Book xvi., chap. 11, says (I quote from the translation of Bellenden)—"King Richard in his returning to London wes tane be his Lordis and put in captivitie quhill he renuncit all richt he had til the crown of Yngland and wes ad-

jugit to perpetual preson. Eftir lang trubble he gat furth of his preson under habit of ane woman and came in Galloway quhare he maid service to ane Scot namit Macdonald. At last he wes knawin and brocht to King Robert the Third be quhom he was tretit in gret reverence. King Richard knawin himself dejeckit from his rial estait gaif him haill to contemplation. Quhil at last he deceisit in Striveling and wes buryit in the Black Freris thairof." Of course, Boece wrote about a century after the death of the alleged Richard; yet still the tradition would be fresh enough to be valid. We have, however, two independent witnesses, both contemporaries of the claimant—Bower the continuator of Fordun, and Winton the Chronicler. The former says:—"Richard deprived of his kingdom, and condemned to perpetual imprisonment, cunningly made his escape, and having been conveyed to the Scotch isles, was recognised in the kitchen of Donald, Lord of the Isles, by a jester who had been educated at the courts of Richard when he was king." (Fordun's *Scotichronicon*, xiv., 50.) "By Donald of the Isles he was sent to Robert III., King of Scotland, through Lord Montgomery. While the King of Scotland lived he was reverently attended as befitted his rank. After the death of the King he was presented to the Duke of Albany, Governor of Scotland, by whom he was treated in accordance with his rank. At length he died, and was buried in the church of the preaching friars at the north side of the altar." The last sentence reads almost like a condensed epitaph:—"Hic Ricardus fuit filius Edwardi Principis Walliæ filii Edwardi Windesor qui rexit annis viginti duobus: mortuiss sine liberis," which one is tempted to translate:—"This was Richard, son of Edward, Prince of Wales, son of Edward of Windsor, who reigned twenty-two years; he died without children." (Fordun's *Scotichronicon*, Book xv., chap. 9.) Later in the same fifteenth book, 32d chap., Bower says:—"In this year died Finlay, Bishop of Dunblane, who built the bridge there. In the same year, on the feast of Saint Lucia (16th September), died Richard, King of England, at the Castle of Stirling (Strivelyn)." Andrew Winton, the author of the rhyming Chronicle of Scotland, tells the same tale, differing in such slight particulars as seem to prove independent information. After relating (Book ix., chap. 20) the trial of King Richard and his deposition, the Chronicle proceeds:—

"Withoutyn dout the court wes hard
With this foresaid King Richard:
For in the tour of London syne
Holdyn he wes a quhill in pyne;
And eftir that on purpos set
Thae brocht him north until Promfret.
Thair wes he delyverit then
Til two well trewit famous men,
Swynburne and Watyrtoune,
Men of gud reputacioun.
There he bade, and wes hard strade;
Great piti of him their gudeness had.
The word in Vngland thae gart spred
That this Richard King was dede.

But eftyr that thair raise tithand
That this Richard wes livand.
And quhow that rais I will tell heer
As I hard thair off the manere.
But I can nocht tell the case
Off Pomfret as he chapit wase.
But in the out Ilys of Scotland than
There was treveland, a pure man,
A Lordis dochter of Ireland,
Off the Bissettis thair dwelland,
Wes weddit with a gentil man,
The Lord of the Ilys bruithir than,
In Ireland before when scho had bene,
And the King Richard there had sene.
Quhen in the Ilys scho saw this man,
Scho let that scho weil kend him than.
Til hir maister sone scho past,
And tauld thair til him all so fast,
That he was that King of Yngland
That scho before saw in Ireland,
Quhen he was there before
As scho drew there to memore.
Quhen til her maister this scho had tauld,
That man richt sene he til him cauld,
And askit him gif it was swa
That he denyit and nocht ya.
Syne to the Lord of Montgomery
That ilk man wes sent in by,
That ilke man syne eftyr that
Robert oure King of Scotland gat.
The Lord als off Cambirnald
That man had aquhill to hald;
The Duke of Albany syne him gat,
And held hym lang tyme efftyr that.
Quhether he had bene King or nane,
There wes but few that wyst certain.
Of devotioun nane he wes,
And seldyn will had til here mas;
As he bare hym like was he,
Offt half wud or wyld to be."

This strange story seems to have been an article of faith among Scotch historians, for David Chambers, in his abridgement of the history of the Kings of France, England, and Scotland (1585, Paris), says of Richard:—"After he had resigned the crown he was done to death in the Castle of Pomfret by Piers Exton, or according to the majority of Scotch historians he died in the land of Scotland, where he

had been a fugitive." In full accordance with this it is found in the Chamberlain's accounts that a certain yearly sum was devoted to the sustenance of this Richard, the alleged King of England. Certain passages of extreme importance have been extracted by Tytler in his "History of Scotland," one of which we give as a specimen;—"Be it remembered also that the said Lord Governor down to the present time has neither demanded nor received any allowance for the sums expended in the support of Richard, King of England, and the messengers of France and Wales at different times coming into the country, upon whom he has defrayed much, as is well known." There are other three such passages, and the last concludes with the claim for the cost of eleven years' support of this Richard, amounting in all to £733 6s 8d; a sufficiently modest sum certainly; but when we remember that Hector Boece was considered to be munificently rewarded when made Principal of King's College, Aberdeen, with a salary of "40 markis Scots," equal to £2 4s 6d sterling, it does not seem quite so niggardly. Further, among many indications in the English records there is the denunciation of a certain Thomas Ward of Trumpington for personating King Richard, and a letter of Henry V., in which he speaks of a conspiracy to bring into England the "Mammet" of Scotland. This title, derived, it is said, from "Mahomet," indicates a figure dressed up for purposes of deception, and from this name given the so-called King Richard I have named my paper. This much seems certain at all events that from 1402 to 1419 there was a person residing in Stirling who, in the September of the latter year, died, and was buried in the Black Friars Church, and that this person claimed to be Richard II., and was treated as such by the Scottish Court. The contention of the English Court was that he was an impostor named Thomas Ward of Trumpington, as aforesaid, and that the true Richard was killed at Pomfret. The proof that he was an imposter really rests on the credit that is to be attached to this twofold assertion. As to Thomas Ward, or Thomas of Trumpington, or Thomas Ward of Trumpington, there is little definitely known. According to one set of proclamations, he is a person of skill and talent, ready to head an army against even the victor of Agincourt. According to another account he is an idiot that the Scottish Court had taken up for purely political ends. There is nothing to show, with anything approaching to certainty, that there

was ever such a person at all,—nothing to prove that, in short, the allegation that "The Mammet" was the aforesaid Thomas was anything more than a piece of finesse resembling that by which Gilbert Glossin, in "Guy Mannering," asserts young Harry Bertram to be not himself, but his own illegitimate half-brother. Certainly the variation in the character attributed to him is a little suspicious. Though, on the other hand, this might be due to defective information, yet, if so, might not this information be yet further defective? Even its denial of "The Mammet" being the person he was asserted to be, might also be due to false information. The first part, then, of the English case, so far as our present information goes, is too incomplete to enable us to build anything on it. Let us now turn to the account of King Richard's alleged death at Pomfret. If here we have a consistent unanimous testimony, then the "Mammet" King must be abandoned. Unfortunately there are three accounts, first there is that which the genius of Shakespeare has made universally known and credited. We need not read it to this society, but we shall read a translation from a nearly contemporary source, a French chronicle, published some forty years ago under the auspices of the Royal Society of Antiquaries, and edited by Benjamin Williams. This is its account: —"It is true that when King Henry had taken the field without London, with all his people who were about to combat the Lords who had risen to support King Richard, he commanded a knight called Sir Peter Exton to go and deliver straightway from this world, John* of London, commonly called Richard, for it behoved the sentence of Parliament to be accomplished. The knight having taken leave of King Henry, rode to the castle" of Pomfret, "where he found Richard confined, who sat at table awaiting his dinner, and Sir Peter called King Richard's esquire trenchant, and forbade him on the part of King Henry to dare to taste any more the king's meat, saying 'he might well eat alone if he chose, for he should never eat again.' The esquire returned to the room where King Richard was seated, who was unwilling to eat because he was left alone, and his esquire would not perform his office as usual. 'What is the news?' said the King. The esquire replied, 'I know of none except that Sir Peter Exton is come, what tidings he has brought them I know

* The Lancasterians asserted that Richard was not the son of the Black Prince, but that his father was a merchant of Bordeaux.

not.' King Richard then begged the esquire to carve him some meat and to taste it, as was his duty. The esquire went down on his knees before the table, begging King Richard's pardon, hoped he would excuse him as they had forbidden him by King Henry's orders, upon which King Richard went into a passion, and seizing one of the table knives, struck the esquire on the head with it, exclaiming, 'Cursed be Henry of Lancaster and thee,' as he uttered these words in rushed Sir Peter Exton to the room where King Richard was with seven men, each man having a lance in his hand. It is true King Richard perceiving Sir Peter Exton and his seven armed men, put the table back from him, and springing in the midst of them, wrung an axe from the hands of one of them that came to murder him, with which King Richard right valiantly defended himself, and in so doing slew four out of the eight men, when Sir Peter leaped upon the chair where King Richard usually sat at meals whilst he was in prison, when he awaited his axe in hand till the King came near to him. The King defended himself so well that it was great marvel how he could so long make head against them, for they were all armed, but King Richard defended himself right vigorously like a good and loyal knight, till at last, in defending himself, he retreated towards the chair where Sir Peter Exton was, who gave him his death blow, for he gave him such a blow on the head that King Richard fell backward on the ground. The King exclaimed—'Lord have mercy on me,' after which he gave him another blow on the head. And thus died the noble King Richard without confession, and he that saith otherwise doth not speak discretely. When the King was dead, the knights who had given him his death-blow, went to sit him down beside the corpse, and began to weep, saying, 'Alas, what is that we have done; we have murdered him who has been our sovereign Lord for the space of twenty-two years, and I shall never go into any country but I shall be reminded of it.' On the morrow the corpse of King Richard was carried to Pomfret, and there was interred like a poor gentleman. God have mercy on him." Such is the account given in the French Contemporary Chronicle, and this account, filtered through Fabyan and Hall, supplied Shakespeare with his scene. But this romance is not all the French Chroniele says. It goes on further to state that in order to save themselves from the accusation of treason, the English historians

gave another account of King Richard's death. This is the account he says was that adopted in England—"When he," Richard, "heard of the death of his brother, the Earl of Huntingdon, the Duke of Surrey, the Earl of Salisbury, and all the other Lords, he was so wroth that he swore that he would never eat again, and was four days without food. When King Henry knew that he would not eat, he sent prelates to comfort him, and persuade him to eat. He confessed himself to one of them, who enjoined on him as a penance to take food, but when he attempted to eat he could not swallow his food, for the conduits of his body were contracted, and King Richard said 'he had come to an end, and must die.'" Walsingham says much more shortly. "Ricardus quondam rex Angliae cum audiesset haec inprotunia mente consternatus semetipsum extinxit inedia voluntaria ut fertur clausitque extremum diem apud castrum de Pontfracto die sancti Valentini." "Richard, late King of England, when he heard of these misfortunes, being overwhelmed in mind, put an end to his life by voluntary starvation, and ended his course at Pontefract Castle on Saint Valentine's day." Similar, but slightly fuller, is the account given by Otterburn. Another class of historians say that this starvation was not voluntary, thus Ickham "a cibo et potu per quatuor ant quinque dies restvictus fame et inedia Ricardus expiravit." "Richard being kept from food and drink for four or five days, died of hunger and want." So says Hardyng also. Here I may say I am following of necessity the authorities quoted by Tytler. We see then there are at least two, if not three, independent accounts of the death, each contradictory of the rest. But it may be said that whatever the manner of his death, the fact of Richard's death is indubitable, for his body was drawn through London in an open hearse with the face exposed, that all men might see that it was the King. But this very precaution suggests a suspicion; the French proverb tells us that he that excuses himself, accuses himself. Personation had not been in the past a feature in English history. Something like three quarters of a century before an English King had been dethroned and murdered when in captivity, but no one appeared to personate him after he was dead. Arthur, Duke of Brittany, had been foully murdered; no one personated him. Perkin Warbeck and Simnel took the hint given them, but before this time there had been no case of personation of a dead man. If, however,

Government knew that he had escaped, if they could secure a body to personate that of the King, that would be so like as to be mistaken for it, then the chance of any revival Richard's claims would be greatly lessened. Was there any such body? and were there any circumstances about the funeral, so-called, of Richard, which made it seem suspiciously like as if they had made use of this expedient? As to the first question, there is no doubt that there was a priest named Maudeleyn who was excessively like King Richard, so like that when the nobles made their conspiracy against Henry while Richard was in prison, this Maudeleyn was to personate the King. So like were they that it might have deceived any one. That priest was beheaded for his share in the conspiracy some month or so before the funeral of the King. It might be urged that the tonsure of the priest, and the mark of having been beheaded, however closely they might join the head to the body, would render the imposture, if such it was, impossible. This brings out the suspicious elements in the funeral. The body was lapped in lead, and the head covered, so that only the face was visible, hence both these convincing signs were hid from view. Yet once more, had the body been lifted in ordinary from the bier, and placed in the coffin, the imposture, if such there was of the kind we have indicated, would have been discovered, the head would have been seen to have been severed from the trunk. The body, however, is suddenly removed to Langley and buried privately. But it may be said that Maudeleyn was beheaded in London and Richard's body—if so it was—was shown in the way we have mentioned at every town between Pontefract and London. But just before this funeral William Lovèney, who having accompanied Henry in his banishment to the Continent, might be supposed to be in his confidence, is sent on a secret mission to Pontefract. Might it not be to convey the head of Maudeleyn, if not his whole body, to Pontefract for this funeral. Further, a certain Mr King has published in the Archæologia, a paper with plans of the Castle of Pontefract, in which he proves according to Mr Williams that Sir Piers Exton's story at all events cannot be true. On the other hand, death from starvation does not ensue with four or five days, either with compulsory or voluntary abstinence from food. Let us, in order to perfect fairly take the case as presented to us by those who hold that the "Mammet" king was an

imposter, and we shall take the case as it is put by Sir James Mackintosh (History of England, 331-332). The first objection cuts both ways—if it were difficult to maintain for nineteen years that Richard were dead while he was alive, much more would it be difficult to maintain he was alive when he was really dead. While the second holds so far, yet Scroop practically issued a second declaration, in which he added to the assertion of the King's having been starved to death, the significant phrase, "as is commonly said," as if now he had reason to doubt what he had previously asserted. The third would have been more potent had Albany not had a game to play that involved the "Mammet" being retained. Moreover, Richard, if Richard it was, seemed to have lost his mental force altogether by his misfortunes. Albany had murdered Rothesay, and had hopes of getting rid of James, it would be well to have some one in his hands that would compel the King of England to befriend him in case of need. When James was taken prisoner, thus Albany, who had, it is supposed, supplied the information which led to his capture, used the "Mammet" to compel Henry to retain his nephew in captivity. On any hypothesis, the action of the Courts of England and Scotland is difficult of explanation; but it seems most explicable on the supposition that it was the real Richard who was kept in Scotland in semi-regal state, but so weakened mentally as to be no serious menace to the stability of Henry's throne, unless used by some dexterous politician. The fourth objection really falls to be considered under the last head. We may notice that Bower says that Northumberland and others came to Richard. The fifth objection, again, is answered by the fact that the French Court had been investigating whether Isabella's marriage with Richard was a valid one, and the decision was that it was not. Even then it was not acted on till a secret envoy is sent to Scotland, who probably found Richard too feeble to give any hope of a resistance to Lancaster. The sixth objection really tends to prove the opposite of what it is brought forward to prove. If Northumberland knew that Richard was dead, the only conceivable reason for him ever hinting at the possibility of his being alive was the fact that his life was strongly believed in by the French. Hence this directly contradicts the fifth objection. If, however, he knew Richard was alive, but not in a mental condition to be of any help in the enterprise he was undertaking, and remembered his pre-

vious assertion of Richard, his conduct becomes more natural. If, after having roused his followers by tales of the King's death by starvation, and attempting to gain the sympathy of France on the same plea, he made the discovery that Richard was probably alive, he naturally would not be inclined to alter his tale and lose the effect produced by sympathy for the sake of one who was alive certainly, but with weakened intellect. Moreover, this is to be borne in mind: Albany and Henry were allies, and Percy well knew that if Henry could make it for Albany's advantage to kill Richard, if it was Richard who was the "Mammet King," no scruple would stand in the way. What would make Henry more eager to offer Albany anything than a formidable rebellion? It was needful, therefore, for Northumberland to be prepared for the contingency of Richard being put to death at any moment. Over against this half-admission, even if it went for anything, may be set the assertion of the Duke of Surrey, after the failure of his conspiracy, as Walsengham tells us, "I shall go to Richard, for he is escaped from prison." A curious circumstance in connexion with this change of Northumberland's mind is the fact that shortly before Northumberland despatched the letter here quoted, he had got possession of Sir Robert Waterton, who, according to both the Scotch contemporary accounts, had aided Richard in his escape. It might be difficult for Northumberland to be quite sure that the feeble man he saw in Stirling was his legitimate King, however like he might be to him; but Waterton's evidence might supply the missing link to complete the convincing chain of evidence. Another thing to be noted is the number of persons who were executed for asserting that Richard was yet alive, chiefly monks, those, in short, who were likely to have direct communication through their order with Scotland. But others also suffered for the same offence,—a half-brother of Richard, who had been one of his gentlemen of the bedchamber, with his armourbearer and page. Another is pardoned for this offence; and in the pardon full particulars are given of the persons from whom he received his alleged information. In this there is reference to William Serle, as the main leader of this effort to reinstate this so-called Richard. Serle had been a gentleman of the bedchamber to Richard; he was one of those engaged in the murder of Gloucester, the King's uncle; and therefore did his testimony stand alone it would be

of less value, as he afterwards retracted his assertion. But, again, the retractation was made in prison in dread of death and in hope of reprieve. The last name is one we are all familiar with, Lord Cobham, the martyr. When seized he denied the tribunal, because Richard, his King, yet lived. This line of defence is the more remarkable that John of Gaunt, the grandfather of Henry V., whose authority he so markedly disallowed, had been favourer of the Lollards and of Wiclif, their founder; and Richard had been noted as a persecutor. He seemed by his course to render his condemnation for treason certain, if he escaped being condemned for heresy. It may be said that the alleged King himself denied his claim to the title. Other impostors assert their claims on all occasions; this man seemed to wish to hide from observation. Does this not rather suit the idea that it was the true Richard enfeebled in mind and body who shrank from a conflict for which he had now neither strength nor inclination, than one who wished to get the full advantage of pretending to be Richard? Such, then, is the evidence for and against the identity of "The Mammet King" with King Richard, so far as your time and my opportunities have permitted me to lay it before you. The evidence, in Burton's opinion, leaves the matter in such a state that it may be regarded as an insoluble enigma; but he seems to lean to the same view as Tytler. On the other hand, Gairdner has decided on the whole against that view, I now leave it for discussion.

NEIGHBOURING FORTS.

When last I laid before our society a sketch of the ancient fortifications and stone circles which encompass the Valley of the Forth, I supposed that I had succeeded in giving a complete list of their number, but I have now to add to it other three ancient structures nearer to our own doors than most of those formerly mentioned. One of these is on the most famous of all the historic ground that Scotland has to show, and to this bold assertion a ready assent will be given when told it stands on the Gillies Hill. We can easily suppose on the great and fateful day of Bannockburn the Stirling gillies looking out from this tower while their hearts beat high as they watched the fortunes of the battlefield stretched full under their sight. I hear that the remains of the round tower of which I tell is by the country people named the "Temple," and is oftentimes the resort of pic-nic parties who all

unknowing its real nature, are yet attracted by some dim feeling of interest in its antiquity. This ruin is situated, not on the summit of the Gillies Hill, as might have been expected, but very near its base, on the brink of the precipitous rock which overhangs the Lime Kilns. From the public road a grassy glade leads up to it by an ascent so easy that it has fared ill with the walls of our tower by making it a matter of little toil to remove its component stones. There is now only so much left of them as barely to indicate what had once been their dimensions. On the south-west side alone does the wall remain so high as 6 feet, 2 or 3 feet represent the general scope, but no doubt judicious excavation would lay open something greater. The diameter of this circular tower or broch appears to be about 70 feet in breadth, leaving about 35 feet as the diameter of the circular chamber. There are slight indications of the former existence of two other concentrically circular fortifying walls, which are to be found at a short distance outside the central wall among the surrounding brushwood. If our Society could induce Colonel Murray to have dug out carefully the outline of this structure, it would be most interesting to many. Continuing along the public road past the lime kilns, and onward till you arrive at the "smiddy," there will be seen behind an isolated rocky knoll of no great elevation, where are the very sparse remains of another fort. It has probably been a larger one than the "Temple." So few, however, are its remaining stones, and these so small in size, that only an eye practised on such ruins would know or understand what they mean. But to such they do indicate the former existence around the knoll of concentrically circular walls, probably 10 feet in breadth. To state any measurement is in this case impossible, but any antiquary would at once recognise here the presence of a true fort. On Wester Craigend Hill, where its beetling brow overhangs the Sauchie Lime Kilns, is another fortified place, circular in form, having a diameter of 40 feet, with a surrounding wall 10 feet in breadth. Of this wall a friend who accompanied me laid quite bare 30 ft. of its circuit. At a distance of 20 feet outward from this wall are remains of a second, which branches off to some distance along the slope of the hill, enclosing ground which is higher than the fort itself, and of course has a serious menace. The westward view from this place is exceedingly fine, and apart from the interest attached to specimens

of the handiwork of our forefathers, will amply repay the labour of a visit.

NOTES ON SOME GALL PRODUCING INSECTS

Wander when or where, mid winter's snows or under summer's sun, the entomologist finds always something to amuse and instruct, for no district, however bleak, cold, or dreary is destitute of insects in some ferm. In winter the nidus of various gall forming insects can be collected; spruces examined for *Cherms*, hollies and other evergreens for the larvæ of some leaf miners. No tree that I know of but is pastured by some entomological specimen. Some species of trees are more subject than others to the depredation of insect foes, also, some trees are productive of more variety. We find about a dozen species of gall flies pasturing upon the oak alone. One fly selects the female flowers, another the male flowers, while a third selects a bud, a fourth with its ovipositor pierces the bark of the branches indiscriminately, and a fifth, the tender shoots upon which the larvæ form galls like marbles. The leaves also are attacked by several gall producers, the galls being as various as the flies which produce them. Several species may be found upon one tree, forming galls as diversified as the position upon which they are produced. The more we study natural history the greater is our wonder and admiration at what it reveals to us, and, the more we endeavour to know, the more are we led into a labyrinth of amazement, and, lost in astonishment at the vastness of the field before us. For on investigating into the life history of these gall flies, some of them are found to be the nidus of a parasitic fly. How or when did that parasite introduce its egg into the larva of the gall fly when it is inclosed in these galls? are questions that await to be solved before we have completed full investigation of these gall producers. It must be immediately after the larva is hatched and before it is encompassed within the gall that the parasite does its deadly work. The Spruce—Gall Aphis—*Chermes Abietis*—is the first of these gall producers that I will notice. The genus *Chermes* occupy a position in science intermediate between the green fly—*Aphis*—and scale—*coccus*. The galls they produce are like pine apples in miniature, but instead of each scale when pulled from the fruit being a pleasant mouthful, they are, when pulled, found to be alive with living creatures. About three years ago I gave you a cursory notice of this insect, but since then I have examined hun-

dreds of galls, therefore I am now in a po tion to go more minutely into their history than I did then. The perfect insect has got four greenish white wings; the two anterior wings are very large with, few nervures, the costal one is the strongest, the others are very indistinct; by the apical one is formed an oval cell, the next one is oblique, the third is the same, but is curved at its origin. The posterior wings are small and nerveless. The body is of a dull yellowish or ochreous green; the eyes are set wide apart, black and granulated, and on the crown placed near to each is a bright ocellus; the antennæ are short, five jointed, and green; the legs also are green with biarticulate tarsi and very minute claws; the rostrum is somewhat short and reats between the anterior coxæ. The head and thorax become blackish brown as the insect gets older and become rubbed, the wings fade after death to a pale brownish pink. After pairing, the female selects a leaf upon which to deposit her eggs, which she does at the sacrifice of her own life. Whether she deposits her eggs through an ovipositor, or when they become mature she bursts open on the under side, I am unable to say. The latter mode, I think, is the correct one, for the eggs are in a cluster beneath the abdomen of the dead insect. A few days after death, a white cottony-like substance prevades the abdomen, and completely covers the eggs. After the eggs are hatched, the tiny insects may be observed creeping over the leaves, and making their way to the buds, around which they congregate. Its colour at this stage is brownish, overlaid with grey; it forms no galls, neither is the perfect chermes of this brood furnished with wings. At the beginning of winter they are to be found clustering—almost overlying each other—at the base of the buds, where they remain securely attached and quiescent This is what I consider the pupation stage, for about the beginning of May they are of a different colour, and large; in shape oval, flattened and woolly, of various tints, said to be mostly green or purple,—all those I have examined were yellowish-green; antennæ and legs short, and ciliated; the back of the abdomen divided into about ten segements by deep transverse striæ, and upon each segement six warts; eyes black. I have endeavoured to count the eggs produced by one insect, but in every instance failed to do so satisiactorily; however, I am within the mark when I say they very much exceed one hundred. Eggs oval, greenish-yellow, changing to a light yel-

low with age, and ultimately, before being hatched, powdered with meal. Galls are formed before the insects are hatched, which they do in about two weeks from the time the eggs are laid. About the middle of May it commences to lay its eggs, when the insect, like its more perfect parent, is covered with a white cottony-like substance, completely covering itself and eggs. By the beginning of April a few white filaments sparsely cover the creatures, which, as the season advances, grow in density, until they appear like a small piece of cotton wool rolled about the buds. I am of the opinion that this substance is one of nature's provisions for protecting the eggs, and shielding the tiny insects when hatched from the vicissitudes of weather. This brood takes several days to lay their eggs. While the larvæ are feeding and increasing in size, galls are swelling by their punctures, within which they are ultimately enclosed, but not all. I have frequently found some of them traversing the outside of the galls, and thought they were smaller than those that were enclosed. How these insects get entombed in the galls is still a mystery. Whether it is that the galls swell and surround them while they are lying quiescent after a surfeit or as a naturalist of high standing, whose observations are generally accurate, says—At a certain stage cracks are formed along the galls into which they go for shelter, afterwards the galls close over them. At the base of each leaf are separate cells enclosing several chemes in which they remain for, from four to six week, when the cells open and the pupæ—which are of a dull whitish colour and powder—bid farewell to their prison, cast their skin and become perfect flies. In this the summer brood there is both male and female, whereas, in the brood hatched in autumn and found about the buds in spring there is only one gender, viz., females, which are fertile at birth. If some member who has leisure would give some time to the investigation of, and report upon how the young chermes get enclosed in the galls it would be of interest to our Society and to naturalists in general. The way in which the pupæ after quitting their cells divest themselves of their old coat is thus recorded by Ruricola—"When these pupæ are sufficiently developed, they fix themselves by their feet and crawl out of their skins, which are of a yellowish-white colour, and remain sticking to the leaves; as soon as they have cast off their coats they become considerably shorter and of a greenish

colour; the crumbled and contracted wings are spread out like little bright green pinions. One of the pupæ which I saw preparing to change, having attached itself, waved about a little for sometime to contract itself and determine all the fluids to its thorax. I then perceived a small white margin to the tail, which was the loose skin that shortly formed a wrinkle down the back; this was followed by a crack along the thorax, which, widening, soon extended to the head, and became by degrees sufficiently enlarged to allow the head to emerge, sliding out so gradually that it was scarcely possible to detect any motion; yet shortly after the first pair of legs was liberated and hung down, and so of the other two pairs successively; but they were not used, as I expected, to assist it in crawling out; and when the tail alone remained enveloped in the skin, the animal raised and depressed itself alternately with unusual force, employing its legs a little, whilst the antennæ were set at liberty and vibrating; and this seemed to be the most difficult part of the operation, for I observed two of them walking about with the exuviæ still adhering to their tails. Immediately after its birth it appeared very weak on its legs, but soon walked off to a vertical position, where it remained nearly quiet, the wings expanding and becoming paler, until in twenty minutes they were completely developed, and I think that the entire change did not occupy more than forty minutes." The American blight—*Aphis lanigeri*—is a naturalized foreigner, and is like some other foreigners, very tenacious of life when once it has got a footing upon our soil. To eradicate them gardeners have been driven to their wit's ends. Various formulas have from time to time been promulgated for their destruction, which if only half as efficacious as their vendors declare them to be the *Aphis lanigeri* would be a *rara insecta* instead of as at present a destructive pest. Paraffin oil is highly recommended by some as a killing agent. One painting of the trees will be quite enough, it will kill all the insects it touches and the trees too. I have used it, but found that it killed that part of the tree whereupon it was applied. I have made the trees as black as a "nigger" with a dressing of coal-tar. The tar weakened the trees and killed a few of the Aphes, but as summer advanced they, too, advanced in their work of destruction. I am confident that nothing will eradicate them, for they attack the roots as well as the branches. For un-

less we are prepared to kill the insects by charring the soil which is removed from about the roots to get at them before giving a dressing of some kind our labour will be in vain. Also a series of dressings will be necessary to be extended over the season. And after all, our labour may not have completely exterminated the foe. When pruning apple trees infested with blight, I have often found protuberances or what I will call galls, protruding from beneath the buds of the previous season's wood. These galls contain the embryo aphis. As the spring advances and the eggs are hatched, the galls open, the young aphis may then be seen in vast colonies with their proboscis extended, extracting the rising sap upon which they sustain life. Naturalists who have studied the economy of this insect say, that the female begins to lay her eggs in the month of August, previous to which they suspect they are viviparous. Generally, shortly after laying their eggs, insects die. Not so this aphis, or else all females are not at this date egg producers. Those which lay eggs may die soon after, for their labour is completed in the propagation of their species. However, I know that in winter, and at all times, many are to be found upon trees infested by them, buried deep in the excrescences they form. By their appearance they are more dormant in winter, little or no motion is observed among them. As summer approaches they get more active, when these females are ready to give birth to their species by producing their young alive. Thus by two modes is this destructive pest kept alive throughout the winter by eggs and viviparious females. Early in spring, upon a close inspection of the excrescence formed by the blight the previous season, will be found a woolly like substance which, when removed, the aphis which have lived the winter through will be found concealed beneath. They are so closely packed over one another, that scarcely anything but their abdomen is visible unless it may be a few young ones traversing over the sluggish bodies of their mothers. These old females are of a reddish or plum colour, with two short six jointed antennæ and six legs, but nearly the whole of the body is clothed with long white filaments, which is supposed to be of a resinous substance, and projects far beyond the apex of the abdomen. The proboscis is tolerably long and stout, and being insinuated through the tender bark it acts like a syphon to convey the sap into their soft and expansive bodies. Their evacuations

is a reddish liquor, which I believe, gives the reddish colour to their body. That these creatures have the power, through their stomachs, like the higher orders, of changing chemically the food they partake of, I have no doubt; also that the colour of that chemically changed food gives the many tints the bodies of the different species of *Aphis* assume. About the beginning of autumn, winged females may be found in company of wingless ones. These winged females I believe to be the progenitors of new colonies especially in localities where they had previously been unknown. The winged males are pale green, the head and eyes are black, and the back of the thorax is pitchy, often powdered over with white, becoming cottony on the abdomen—which is broad, the apex pointed; the tubes are wanting; the wings are transparent and iridescent, the superior are very long and ample, with a green stigma, one large marginal cell, a furcate nervure near the tip, the basal not reaching the subcostal nervure, and there are two transverse ones approaching each other at their origin, but remote at the outer margin; the inferior wings are small, with a subcostal nervure, situated towards the apex, and two oblique nervures near the disc; the antennæ and legs are pale greenish-ochre, rather short and slender, the former are filiform and composed of seven joints, the third elongated; the hinder legs are not elongated, and the tarsi have two joints, and are terminated by minute claws. Some naturalists have separated this fly from its congeners the *Aphis*, and placed it under the generic name of *Eriosoma*, woolly body. The principal cause of the separation is that the tubes which are situated en either side near the apex of the abdomen, and form so characteristic a feature in the genus *Aphis*, are wanting in this species. *Eriosoma bursaria*, which infests the poplar, is a typical species of this genus, and will, upon examination, be found to differ materially from the American Blight. The shape of the insects and the nerving of the wings show no family resemblance, whereas, upon comparing the true Aphis with the American Blight, the family likeness is very observable to all.

The usual monthly meeting of this Society was held in the Smith Institute on Tuesday, 7th September—Dr Galbraith presiding. There was a good attendance. The Rev. Mr Goldie read a most interesting paper on "The Old Burgh Laws of Scot-

land." At the close the Chairman said the meeting was greatly indebted to Mr Goldie for having in his holiday time and amid his numerous avocations found time to prepare so attractive a paper, which gave such interesting glimpses of oid Scotch customs. He begged to move a very hearty vote of thanks. This was carried by acclamation. This was all the business.]

THE OLD BURGH LAWS OF SCOTLAND.

On leaving Stirling, Mr John Bruce of the Inland Revenue Office, presented to this society, through me, two large volumes of Old Scotch Laws. The one volume—a large quarto with some curious ornamental initial letters—is, to quote the substance of its lengthy title "Regiam majestatem. The Auld Lawes and Constitutions of Scotland. . . . fra the daye of King Malcolme the Second until the time of King James the First—translated out of Latine in Scottish language. . . . be Sir John Skene of Curriehill, clerk of our Soveraigne Lord's Register, Counsell, and Rollis, at Edinburgh. Printed by Thomas Finlason, Anno Domini, 1609." The other volume is a large folio with genealogies and portraits of the Scottish kings, and many beautiful ornamental initial letters. It is entitled—"The Laws and Acts of Parliament made by King James the First, Second, Third, Fourth, Fifth; Queen Mary, King James the Sixth; King Charles the First, King Charles the Second, who presently reigns; Kings and Queen of Scotland. Collected and extracted from the publick records of the said kingdom, by Sir Thomas Murray of Glendook, knight and baronet, clerk to His Majestie's Council, Register, and Rollis, by His Majestie's special warrand. Edinburgh: Printed by David Lindsay, Anno Dom. MDCLXXXI." These volumes are a valuable addition to our library, containing as they do important matter for the antiquarian, and especially for the student of Scottish history and of the Scottish language; and our best thanks are due to the respected donor for his very handsome gift.

On obtaining possession of these volumes I resolved, from the ample materials which they afford, to prepare a paper for this society on the "Old Burgh Laws of Scotland." But owing to various circumstances, I regret to say that I am here now rather with the raw material for a lecture than with a lecture itself. I therefore crave your indulgence and hope you will take the will for the deed.

At an early period there were four royal burghs—

there were more than four burghs—but there were only four which had special privileges—viz., Edinburgh, Stirling, Berwick, and Roxburgh, the representatives of which met annually at Haddington as "the Court of the foure Burrowes." But in a Parliament held at Perth on March 6th, 1348, it was ordained that so long as Berwick and Roxburgh are "deteined and holden be Englishmen the burghs of Lanark and Linlithgow sall be receaved and admitted in their place"—"bot quhen the other twa burghs returnes to the possession of the King's hand, they sall bruke and enjoy their awin privilege without delay or contradiction."

In these olden times there was no household suffrage, and no ward meetings; no reporters or newspapers to report or comment upon the Town Council, which was a self-elected body, although, of course, the opinions of the general body of the burgesses had to be taken into account. The burgesses, as we all know, were a privileged class, they alone being allowed to prosecute a trade within the bounds—and the law strictly required that no man should be admitted a member of the Trades corporation or a burgess who was not thoroughly qualified in his calling. In process of time, no man was qualified to be a burgess who did not at least own a rood of land, and for every rood which he had, whether it was waste or cultivated, he had to pay to the king the yearly duty of five pennies. The magistrates were to be chosen "of faithfull men of gude fame" by the Common Council at Michaelmas. As to the Courts within the burgh, "There is three head courts within the burgh, at the quhilk all burgesses sould compeir. The first is after the Feast of Michaelmas, the second is after the Nativitie of our Lord, the third is after the Pasch." All absentees, unless they were sick, or forth of the country, or at a Fair, had to pay a fine of four pennies. But every absent burgess who dwelt in the country beyond the bounds of the burgh had to pay "aucht shilllings" because he was "not compelled to come to any court bot to thir thrie yearly head courts."

The office of Provost carried with it certain pecuniary profits. The fines imposed for breach of the law in regard to bread and ale pertained to him, and if he neglected his duty as to the bread and the ale, his body and his moveable goods were to be at the King's will. He was also entitled to a yearly duty of four pennies from every brewer. As to sasins within the burgh—"Quhen any man selles

his land, or any part and portion thereof, he quha selles sall stand within the house, and come forth of it, and the other quha buyes sall stand without it; and the ane sall give to the Provost ane pennie for his passing forth; and the other sall give any pennie for his entres and saising. And gif they exchange lands betwix them, ilk ane of them sall give twa pennies." The Provost was also entitled to a rent from stall-holders in the market who were not burgesses. "Ilk stranger (cremar) sall aggrie with the Provest the best way he may, or he sall gif ane halfe pennie ilk market day." The stranger merchant who had a covered stand or booth in the market was to pay a half-penny, but if his stand was not covered, he was to pay a farthing only. As to his jurisdiction as a judge, the Provost could not compel any man to swear anent the breaking of the law except some one lodged a complaint against him. If there was a complaint, but no witnesses, the defender might, by his own oath, and the oath of five others swearing with him, purge himself before the Provost. If the Bailies or Sergeants (town's officers) had a charge against any man, they could not produce witnesses against him, but the defender was allowed to acquit and cleanse himself before the Provost according to law. It was the duty of the Provost, with consent of the community, to appoint liners or land measurers, four wise and discreet men at least, who should faithfully, when required, measure any lands within the burghs, and in the event of any just complaint against them, they were to be fined. No fine in the burgh court was to exceed "aucht shillings." It was unlawful for the Provost, the Bailies, and the town's officers to brew ale or to bake bread for sale. Any man speaking evil of the Provost or Bailies had to sue for mercy, and swear upon the Holy Evangel that his words were false, and promise not to do the like again, but if he repeated the offence, he was at the will of the Provost, Bailies, and neighbours, to make amends for his injury.

The Magistrates, Provost, and Bailies, as well as the Town's Officers, had to answer for their conduct at the Chamberlain Air, a court held periodically by a King's Chamberlain. All Burgesses were also cited to appear before that court—and all absentees were fined—to testify that the Magistrates had a proper commission and administered the King's laws justly within the burgh. The Magistrates had also to answer for themselves.—Did they do justice equally to the rich and poor? Did they take bribes

in administering the law? Did they search the burgh for lepers and when found cast them out? Did they make examination every week or fifteen days anent bread, wine, ale, (not a word about whisky) flesh, and other things which should be examined within the burgh, and did they punish offenders? Did they raise stents and taxations unlawfully? Did they sell the liberties of the burgh to strangers and give them the privileges of burgesses? Did they cause the burgh to be walked nightly by sufficient watchmen, and did they make the rich to watch equally with the poor? The town's officers were also questioned in a similar manner as to their duty. The Magistrates, however, were not subject to any other court than the Chamberlain Air. One may sometimes question the wisdom and justice of the laws—but no one can complain of any lack of supervision as to the strict administrations of them such as they were. How would our Magistrates and Town Council, with the police, like to be strictly examined as to their duties by the Lords of the Justiciary Court? Such an examination would imply the necessity for something else, even a thorough revolution in the morality of the burgh.

As to Burgesses.—Every burgess had to possess a rood of land, for which he paid to the King a feu duty of five pennies yearly, and to provide against faggots no two men could have burgess rights from joint proprietorship of one piece of land. The rights and privileges of burgesses were inviolate. A burgess could only be prosecuted at law within his own burgh and judged by his own peers. No man could be a pledge or bail for a burgess but a burgess only. Any plea between a burgess and a stranger merchant had to be settled before the third flowing and ebbing of the sea. None could make or cut cloth or buy wool to be dyed, or have an oven, or have weights and measures but a burgess only. A burgess might poind any man except during the time of a Fair (the subjects had peculiar rights on such occasions which could not be interfered with) or the man who was in the army or keeping the King's Castle, but a burgess could not poind a fellow burgess without the leave of the Provost. All the quarrels, complaints, or pleas arising within the burgh should be decided there, unless they pertained to the King's Crown, in which case they were to be decided on the coming of the justiciar. A burgess had also the privilege of buying and selling within all parts of the realm. Merchants were

enjoined to purchase their goods from burgesses. Burgesses might sell the land which they had acquired by their own industry, but not the land which they had inherited except in cases of necessity, and only with the consent of the next heir. The son of a burgess so long as he sat at his father's table had the same liberty to buy or sell as his father, but no longer. A disobedient and rebellious burgess or resident was to be banished the burgh and his house cast down to the earth.

From an early period the Kings had a number of castles throughout the country, and the keepers of those castles were not always very just or considerate in their dealing with the burgesses. Hence the following laws—"Na Castellane (Castle keeper or servants) may enter within ane Burges house to slay his swyne, gryses, geise, or heunes; bot he sall come to the dure of the house, and sall demand and speir gif he has any sic thing, as said is, to sell for silver to the King's use, and gif he any hes, he may sell it. And gif he hes and will not sell it, and it be found upon the calsay it shall be lesome to the Castellane to slay it, and the neighbours sall set ane price upon it, and the price sall be given to him to quham the beasts perteines. And the Castellans or King's servants sall not do this but thrie times in the year, that is, at Yule, and Pasch, and Whitsunday only." There was also this law—"Na Burges may be compelled to lenne to the Bailies of the King's Castell of his gudes, bot untill fourtie pennies, and for the space of fourtie dayes. And gif the Bailie (Castellan) restores, nor pays not againe the debt within fourtie dayes, the Burges sall lenne to him nae mair except he please of his awin gude will." Ycu observe it is not said that the burgess might recover his money in a court of law, he has only the liberty of declining further demands upon him.

There was the law of *Single Combat*. In a parliament of Robert III. A.D. 1400, it was decided in what cases single combat should be had. "It is statute that in singular battel foure things are required. *First* that the deed for the quhilk the defender is appealed is capitall, and may be punished by the death. *Secondly*, that it is quietlie and reasonablie done and committed. *Thirdly*, that he who is appealed be held in suspect, be conjectures, or probable suspicions and presumptions. *Fourthlie*, that the cause or controversie may *not be woven otherwise than be battel*, and not be witnes, nor be instruments, letters, or be wreit." Seventy years

previous to this in the time of David II., it had been decided at Scone, that if any knight or knight's son or freeholder of lands or freeholder's son accused any man of reif, slaughter, theft, or other crime, it should be lawful for them to choose another person to fight the accused for them, at Stirling Bridge in the King's Court or in any other court. None but masters or lords had the privilege of a middle man or substitute, and the reason assigned is characteristic of the times. "Because be the law, the bodie and the gudes and geir of the tenant should be readie for the protection and defence of his maister." Now a burgess's rights as to single combat were clearly defined. If a landward burgess dwelling without the burgh challenged a burgess resident within the burgh, the latter was not compelled to fight but might defend himself by the common law of the burgh. But if the burgess within the burgh challenged the burgess without the burgh, the latter was bound to fight. The burgess could decline battle with all landward men unless he was accused of treason or a question arose about his liberties or estate and then he should defend himself in combat, but only beyond the burgh. A king's burgess might compel an earl's, an abbot's, a prior's, or a baron's burgess to fight, but none of them could compel him.

WOMEN.

Before proceeding further, let us glance for a moment *at woman's position and rights in the old burghs.* She might be a brewer (indeed, brewers were mostly women, who kept taverns) and sell ale, provided she put out a sign at her window or her door intimating that the ale was to be sold to all men, "quilk if she does not she sall pay ane unlaw of foure pennies." If she made bad ale, she was to pay a fine of "aucht shillings," or be put upon the cockstule, and the bad ale was to be given to the poor folk, and the third part to the poor in the hospital. (I may say by way of parenthesis, it gives one a very low idea of the benevolence of the time, that unsound meat and impure drink, which were unfit for common use, were generally sent to the lepers and the poor). A daughter had the same rights as a son to the heritage at the father's decease. A widow, "sa lang as she remains a widow, sall possess the inward part of the house called the *flett*, and his heirs (of the deceased) sall have the outwarde part of the samine house, gif he please to dwell therein. And this is trew, gif the wife has not ane other dowarie, for gif she has any other

dowarie, she sall possess the samine, and the heire sall possess the principall house." If a burgess had been twice married, the property acquired in the first wife's lifetime passed to her child, and the property acquired in the second wife's lifetime to her child,—"and the secund wife sall not remaine in the house perteining to the first heire, after the deceis of her husband, but only be the space of fourtie dayes." By a law called "The Courtesie of Scotland," the man who got lands as a tocher with his wife might hold them after her decease all his days. A husband might appear in a court of law for his wife, answering for her, and defending her. But if she committed trespass against her neighbours, and got involved in an action at law without her husband's consent, and answered foolishly in court, he, a burgess, was not obliged to become responsible for her above the value of four pennies. "Bot," it is added, "he sould correct her as not knawing quhat she sould doe, and as ane barne within age, seeing she is not at her awin liberty." That is, a wife in certain cases was to be treated and chastised as a child. It was wife beating, but in love. The legality of such a thing was certain, as the following case, of the time of David II., shews:—"Gif ane man will doe anything agains ane other (or accuse him) for the death of his married wife, he sall not be hard to persew him, except it be notoriously knawen, that the husband did slea hir, quhere throw sche died, speciallie gif he did love hir as ane husband sould love his wife. In the time of King David, ane case happened in this mater. Ane man of gude fame gave to his wife, descended of great blude, ane blow with his hand of gude zeale and intention to correct hir. And she being angrie with hir husband after that day, wald not for na mans request eat nor drink until she deceased, and entered in the way of all flesh. The friends of the woman accused the man for the slauchter of his wife, and because it was notoure and manifest that he did not slae hir, nor give hir na wound of the quhilk sche died, but gave hir ane blow with his hand to teach and correct hir, and also untill the time of hir death loved hir, and entreated hir, as ane husband weill affectionat to his wife, the King pronounced him clene and quit. And thereanent made this law,"—the law, namely, that a man may chastise his wife if he does it in love, and for her benefit.

AS TO TRADESMEN.

Bread, ale, and flesh and other articles were to be

sold only in the open market to all men, strangers, as well as others. The price at which articles were to be sold was fixed by the honest men of the town or the magistrates. Free trade was unknown. Goods of any kind brought to the port of the burgh were not to be sold until they were brought into the market place, and no man might pass out of the burgh to forestall the market. All articles were to be of the best under pain of punishment or of a heavy fine. Nor might tradesmen keep the best of their merchandise above a certain quantity to themselves.

The *Baxter* or Baker was to make good bread and sell it in the window of his booth or in the market place, the price and weight of the bread to be determined by the price of the wheat. The man who had an oven might not have more than four servants, a master who was to be paid a penny at each baking, two servants who were to receive a penny each, and a boy who was to receive a farthing. The *Browster* or Brewer was to put up a sign and the ale was to be tasted and judged by tasters appointed for the purpose. He could purchase in open market no more than a chalder of oats at a time for brewing, and he had to pay a fixed duty to the Provost. The *Flesher* was to sell good flesh, beef, mutton, and bacon in open daylight at the sight of the gude men of the town. Fleshers were to serve Burgesses att the time of the slaughter of *mairts* from Michaelmas to Yule, and while so employed were to have their meat and drink in the Burgesse's house and were to be paid a half-penny for the slaughter of an ox or a cow, or a swine, or of five ewes. Fleshers were not to buy wool or hides. Hides could be bought by Burgesses only in the open market, and not quietly in the vennels. The *Miller* was to have a master and two knaves in his mill, who were to be sworn that they would be faithful to the King and not be guilty of any fraud in their calling. It was not lawful to grind corn with handmills except in cases of necessity, and in no case were more than two handmills to be used. There was a mill for every district to which the dwellers in the district should resort—and if a man went to the wrong mill the lord of the right mill was to appropriate the horse, while the miller was to retain the corn and the sacks. The *Sowter* or Shoemaker might not bring hides to be tanned or barked unless the horns and ears were of equal length, the evident intention being to make sure that the animal was of sufficient age to yield good strong leather. The

Kemester or woolcomber or carder who had sufficient work in the burgh and passed to the landward to prosecute his calling was to be apprehended and imprisoned. It is not very easy to see why, but neither souter, nor litster or dyer, nor flesher could be guild brethren unless they swore that they would not carry on their trades with their own hands but only by servants. Every tradesman might be tried as to his honesty or good work—just as the Magistrates were tried, as to their offices, at the Chamberlain Air.

AS TO WEIGHTS AND MEASURES.

"It is statute be King David II. (A.D. 1330-70) that ane common and equall weicht, quhilk is called the weicht of Cathnes, in buying or selling, sall be keeped and used by all men within the Realme of Scotland. (2) The law of God commands, thou sall not have in thy bagge twa manner of weichts, ane mair, and ane less; neither sall thou have in thine house divers measures, ane great and ane small; bot thou sall have ane richt and just weicht. (3) Gif anie man agains the command of God's law, uses any unequall weight, he sall pay to the King's Justice aucht kye, for his fault and transgression."

The Trone or common beam for weighing was also instituted by King David II. in 1365. "It is statute that the Chalmerlane sall cause big, and make ane Trone for weying of woll in all the King's burghis, and in all parts of the realme. And in ilk place, there sall be ane maister of the same, quha sall receave fra the King, ane pennie for ilk sack of woll (quhilk conteanes twentie four stanes.) The customers may have ane clerk gif they please upon their own expenses. And the clerk of the coquet (or custom house) sall control beath the custamers, and the tronans (or the weighers)." At a later date it was enacted that—"Ane burgess may have in his house, ane measure for his cornes, ane elnewand, ane stane, ane pund to wey, all these . . sould be sealed with the seal or standert of the burgh. Quha ever is found with ane false measure, he sall be ane in unlaw" (or fine).

The manner of determining the standards of weights and measures was rather quaint and curious. "King David's common elne conteines threttie seven measured inches, with inches of three men; ane meikill, ane middill, ane lytill; and sall stand conforme to the middill inch; or conforme to thrie grains of bear without the tails." That is the thumb nails of three men of different sizes were to

be measured, and the thumb nail of the middle man was to determine what the inch was to be,—or the same might be determined by three grains of bere without the tails or the bristles or beard. Among other things it is declared—"The unce conteined in the time of King David foresaid twentie pennies,—in the time of King Robert the First, it conteined twentie ane penneis; but now in our dayes, that is of King Robert the Third, in the yeare of grace 1393, the unce of his money conteines threttie twa pennies. The *Stirlin* in the time of the said King David, did weay threttie twa graines of gude and round quheat; but now it is otherwiaeis, be reason of the minoration (or lessened value) of the money. Ane *waw* sould conteine twelve stane; the wecht quhereof conteines aucht pound. The Boll sould conteine ane sextarius, that is twelve gallons, &c. The gallon sould conteine twelve pound of water, that is, of sea water foure pound; of rynnand water foure pound; and of standand water in stankis foure pound, &c." A further explanation as to the inch is given:—"The inch in all measures sould be measured at the ruit of the naill; and sould be in lenth conforme to thrie grains of gude beare without the tails." More peculiar and amusing than any of these was the law in regard to keeping the fishing streams free or clear for the passage of the fish. "The assise or constitution, made be King Alexander (II.) at Perth upon Thursday before the Feast of St Margaret, and the Earles, Barones, and Judges of this Realme that the streame of the water sal be in all parts swa free, that ane swine of the age of three yeares, well fed, may turn himself within the stream round about, swa that his snowt nor taill, sall not touch the bank of the water."

I may also refer in passing to the amusing reasons in one case at least for the making of a law. Here it is. "Ane man passand be the King's hieway, callis before him twa schiep, bound together with ane tow, and with the twa ends thereof; and be chance ane horse haveand ane sair back, is lyand in the same hieway; swa, the ane of the scheip passes be the richt side, and the other scheip be the other side of the horse; and the tow wherewith they are bound tuiches his sair back; quhere thro he is moved to rise up; and caries the sheip hingand the ane upon his ane side, and the other upon the other side, here and there in sundrie places, and through the fieldis, untill he comes to ane open miln without ane keiper, havand ane fire in the middle flure, and the fire being scattered the

miln is brunt with the twa sheip and the horse. It is demanded wha shall answer this skaith and damnage? It is answered, the owner of the horse sall pay for the twa scheip, because the King's hie way sould not be occupied be the horse. And the miller sall answer for burning of the miln, for the horse, and for the scheip, and for all other skeath, and damnage done to the miln, because he left the miln and fire in it without any keeper. And it is to wit that the King's way or get sould conteine in brede fourtene foote, in the quilk na damnage nor violence sould be done to any man."

But to return to the weights and measures. They were strictly tested in every burgh by the clerk of the Chamberlain Air. "The Trone wechts to be maist sharplie examinate, and that they agrie with his (the Clerk's standard) wechts and measures in nae mair nor na less." The Magistrates had also the power of judging and punishing offenders. We have already seen that the man who was convicted of keeping unequal weights or heavier and lighter weights, was at one period to pay aucht kye to the King's justice. At another time the punishment was much heavier, and is called "The great paine of fals wechts and measures. Gif any man or woman be inquisition of the Bailies is convict of false wechts and measures, he sall be in the King's mercy of life and limme, and of their lands and tenements, and their heires sall be forfaulted, except the King of his grace remit them."

There were sergeants or town's officers, but no policemen, in these days, and every inhabited house was bound to send forth a man of full age to watch for fear of peril, and widows engaged in buying and selling had each of them to find a man to watch in their stead, "when curfure (curfew) is rung in he sall come forth with twa weapons, and sall watch cairfullie and discreitlie until the morning, or pay a fine of four pennies."

Only a man of gude fame and authority might walk or travel in the night unless it were to bring a priest to a sick man, or carry corn to the mill, or bring corn from it, or to receive stolen goods, or on the King's business, and even then he was to have the testimony of the gude men of the town from which he set out, and of the town to which he came. No one might lodge a stranger more than one night and not without a pledge from some one for him, and if the stranger remained more than one night he had to answer to the Justice or Sheriff. Those who sold bread or ale or kept taverns were to harbour

strangers and sell to them at the usual prices, and if such strangers went away without paying it was at their own peril if they suffered injury by resisting those who were sent to apprehend them. If a burgess went on pilgrimage to the Holy Land or to any holy place his house and his family were to be under the protection of the Provost and Bailies until his return.

Leprosy seems to have been a very prevalent disease in Scotland in these days as it is in Norway to-day. If a leper had means of his own he was to be kept in the Burgh Hospital at his own expense, but if he was without means, the burgesses were to make a collection amounting to twenty shillings for him, of course as often as was needed. He might not enter the town unless to pass through it, and was not to beg from door to door, but might beg at the port or ports of the burgh. No one was to lodge a leper under a heavy fine.

The magistrates, although their sanitary views were not these of to-day, had much to do in keeping the streets clean and clear of middens. Beasts were also troublesome. If a burgess's swine did damage to a neighbour, "the swyne fand doing the skaith, without any man followand them, conforme to the lawes of the burgh, may be slain and eaten by him wha findes them." The owner of other beasts doing damage, had to pay a penny for each foot of the creature, or satisfy for the skaith. If beasts broke down the principal hedge of a burgess, the owner of the beast had to satisfy for the skaith, and repair the hedge, and give four pennies to the servant of the owner. "Gif any man findes geis, hennes, or goates, doand to him skaith, he may take the head with the beak of the geis and the hennes, and stick them in the earth, and sall eat their bodies gif he please. And he sall escheit the goates and eat them gif he please."

The attenders of Fairs, which were very important institutions, had certain privileges which they did not enjoy at other times. On an appointed day the peace of the Fair was proclaimed, and the bailie of the fair presided over it so long as it lasted. No man could be taken for debt, no bond servant could be taken by his master, no one indeed unless he broke the peace of the Fair, or was a traitor to the King, or was one whom the Church could not defend, that is one who could not be lawfully taken under the protection of the church.

But I must bring these very fragmentary notes to a close. They at least let in some light upon queer

quaint times. They shew that our forefathers were in some respects very different from ourselves. None of us will be inclined to say the former times were better than these.

The annual meeting of this Society was held in the Smith Institute on Tuesday, 5th Oct.—Rev. Mr Goldie, acting president, in the chair. Mr David Chrystal and Mr Ferguson, National Bank, as secretary and treasurer, submitted their annual reports, which were thereafter adopted by the meeting. They were as follow :—

SECRETARY'S REPORT.

The report this year will be of the briefest description. The meetings have taken place regularly according to the syllabus, and the papers read at them have been well within the range of the society's operations. The exhibits have been of a more than usually interesting nature, and altogether, so far as this part of the society's work is concerned, there is no cause for complaint. The attendance has been very unsatisfactory. In fact, all the ornamental members have now dropt away, and it is a question of some difficulty as to what course ought to be adopted in regard to the meetings in the future. The main feature outwith our proper work of the year, has been the delivery in our town of the Gilchrist Course of Lectures. Although unfortunately these were not a pecuniary success, their educational value, cannot, we thlnk, be over estimated. It is also cause for congratulation that they were so largely taken advantage of by those for whom primarily they were intended to benefit.

TREASURER'S REPORT.

Balance from last account,	£0	14	0½	Paid stationery,&c.	£0	18	4
Subscriptions received,	9	3	0	Printing and advertising,	5	10	8
Transactions sold,	1	5	0	British Moss Flora Sect. III.,	0	10	6
Interest on Bank Account,	0	0	9	Cooke's 'Desmids', 4 parts,	0	16	0
				Burt & Shaw, for removing cases,	0	3	4
				Fire, Gas, and use of Museum room	1	10	0
				Cleaning, Lighting and arranging room for meetings,	1	0	0
				Balance to next account,	0	13	11½
	£11	2	9½		£11	2	9½

The retiring President's address was next read by the Rev. Mr Goldie, and was to the following effect :—

PRESIDENT'S ADDRESS.

It is customary in societies of this kind for the retiring President to give an address, and our late lamented President, Mr Croall, was wont to follow that practice. But what was laudable in him may not be laudable, but the reverse, in an unscientific man like me. You have greatly honoured me by keeping me in office ever since the Society had existence. It was all very well so long as Mr Croall lived, but after his removal the situation was greatly altered, for you put me into his place. Although I appreciate your kindness, and am grateful for it all, I have since then felt myself like a man in a position for which he is not qualified, or with another man's hat and coat. It was only because you thought that my presence in the chair would be of advantage to the Society that I consented; I let you have your way without changing my opinion. If you thought I was the likeliest man to do nothing, you must confess that I have not greatly disappointed you. On one occasion during the year I did attempt something, but I hope you will remember it is human to err, and forgive me. Seriously, if you can find another acting President I shall be glad, not only because I feel my unfitness, but because during the winter months especially I am so burdened with work as to have almost no time at my disposal. You might get one who would be better qualified and able to carry on the work with greater enthusiasm, while I would lose none of my interest in the Society, and do no less work in advancing its interests. As we look at our failures, and realise that the Society has not reached our ideal of what it should be, we are apt to conclude that it has been a comparative failure, but when we look at the other side, and realise what we have accomplished, we cannot but conclude that to a considerable extent the society has been a success. During the past years of our existence we have had many most interesting and valuable papers and lectures by some of our members as well as by strangers, lectures and papers which have found a permanent record in our published transactions, which will in coming years be prized by students of the subjects on which they treat. Valuable work has also been done by members of the society in the various fields which we have undertaken to cultivate. Those members, enthusiasts in their own departments, have been the life blood of our society, and but for them it is to be feared, we would have

had a very languishing life, if not an untimely death. All this work has not been done in vain. We have obtained valuable information and evoked an interest in scientific subjects which would not otherwise have existed, or a spirit better than that which finds enjoyment in sensational and ephemeral literature, or in employments which go some length in proving that we have been evolved from lower forms of organic life, which are better subjects for study than for imitation. Still there are certain aspects in which the society has not been so successful as it might and ought to have been. Our members as a whole have such an admiration of the workers and their work that they are content to sit still in their admiration. Now that may be very good and somewhat encouraging, but something better ought to be expected. We should all be workers and do the little or the much that we can. We should certainly read largely and be well informed on all subjects—be Encyclopædic or Cosmopolitan in our knowledge if we can—but second-hand knowledge is not so valuable as that we acquire at first hand for ourselves. Universal men seldom do anything to add to the stock of knowledge. If our minds are to be healthy, vigorous, educated, we should make some department of study our own, and it will become all the more our own if we note down our observations and discoveries—our facts, for facts are "chiels that winna ding"—and have them recorded for the benefit of others. It would be a mistake to frown upon long papers or lectures, but it would be au equal mistake if we regarded such productions as accomplishing our aim and our end. We must have short papers, they need not be more than half-a-dozen sentences, on local subjects. You come upon a rare plant or something peculiar in a common plant, or on a rare bird or insect, or peculiarities in a common bird or insect, or in a pebble, rock, or boulder, with something peculiar in its structure and situation, or on something peculiar in rock stratification, or on some antique object or some fact connected with the ancient habits or history of the district. Now you have just to note such things down and send in the note to the Council and a place will be found for it. It is desirable that the Council should have a number—the more the better—of such notes in hand. Every member would in this way render most desirable and effective help and increase the common stock of information. Some may be deterred from helping in this way, because they have an impression

that their help would neither be acceptable nor effectual. There could not be a greater mistake and the sooner it is dispelled the better. One fact or even half a fact is important, because it may lead the way to some valuable discovery. By facts or hints of facts trivial in themselves, human knowledge has in a large measure attained to such enormous proportions. No doubt science is a modest maiden, but there is no occasion for her being shame faced. We shall consult the modesty of every one. The name of the contributor may be concealed, or the paper may be read by a substitute if you think your elocution defective. Indeed we are willing to meet your wishes in any way if only you will give us the observations and the facts for which we are hungering and almost famishing. By the reading of the kind of papers now referred to, we would deepen the general interest and make our meetings more lively by evoking questions and remarks all round. Besides, we would perhaps attract to our meetings and increase our membership by a class of men whose presence would be a strength to us. Our studies lie in the departments of natural history, and of archæology, or in the works of the Great Creator, and in the works of men who lived in the centuries before us. The time is past when antiquarians or archæologists were made the subject of ridicule. Archæology is not now a mere endeavour after pokers, ladles, and tobacco-pipes, it is a science, it is unwritten history; it tells us what sort of men lived long ago; what were their habits, aspirations, occupations, and works. It tells us that greater things were accomplished in an imperfect or semi-civilized state than we had thought to be possible. It tells us that even in the most advanced state of former civilizations the kind of men were much inferior to the kind of men in the present, and brings us to this, that a mighty civilizing power intervened within the period of written history, which has given a new kind of men and a new history to the world. It is this mighty power, this Christianity, that has both directly and indirectly given us the science of to day, for it has trained and taught the men who have carried science to such heights of achievement. It is only within the Christian era and in Christian countries, that true science has flourished. Even to day where there is no Christianity, there is no science. The study of science without the guiding light and the restraints of Christianity, may be, and is a dangerous thing. But that is no reason why we should not

study the works of the Great Creator, know more of Him, and advance our mental, moral, and religious well being. There seems to be no limits to science but the limits of our minds and of our locomotion, and the fact that we ourselves are parts of nature, and therefore can never get behind it to view it in all its facts and bearings, because we can never get behind ourselves. But as in archæology, we come upon undoubted proofs of intelligent men long before our time; so in nature, we come upon undoubted proofs of a mighty mind that is the soul, and a mighty hand that is the shaper and the ruler of all things.

The following gentlemen were elected office-bearers for the ensuing year:—Presidents, Colonel Murray of Polmaise and Colonel Stirling of Gargunnock; Acting-President, Rev. Mr Goldie; Vice-President, Dr Galbraith; members of council, Mr Walker, Garfield House, Mr A. Moyes, Mr Sword, Mr R. Kidston, and Dr Drew. Mr R. S. Shearer and Rev. Mr Ormond retire by rotation. Treasurer, Mr Ferguson, National Bank. The office of secretary remains to be filled up, but Mr Robert Kidston has kindly consented to act as secretary in the interim.

Mr Goldie thanked the meeting for again electing him President. He had only been induced to accept the position by the fact that in Dr Galbraith, Vice-President, he had a most efficient substitute, upon whom would devolve a large share of the work during the winter months. Votes of thanks to Mr Goldie for his interesting and practical presidential address, and for his conduct in the chair, and to Mr Chrystal, secretary, and Mr Ferguson, treasurer, for their services during the past year, wound up the business of the meeting. A very interesting specimen of the water beetle was exhibited by Mr Gilbert MacDougall.

TRANSACTIONS

OF THE

STIRLING

Natural History and Archæological Society,

FOR THE YEAR 1886-87.

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CONTENTS.

PAGE

NOVEMBER MEETING—

Paper on The Napiers of Edinbellie-Napier and Culcreuch, by Mr A. F. Hutcheson, M.A., ... 1

Ornithological Specimens exhibited by Mr Sword.

DECEMBER MEETING—

Hints on the Study of Ornithology, by Mr James Lumsden, F.Z.S., ... 13

Notes of Excursion to Loch Lagan, Leckie, and to the top of Carleatheran, Gargunnock Hills, by Mr R. Kidston, F.G.S., ... 21

FEBRUARY MEETING—

On the Drip Moss, by Mr A. M'Lellan, M.A., ... 22

MARCH MEETING—

On Old Scottish Woodwork, by Mr J. W. Small, F.S.A., Edin., ... 29

APRIL MEETING—

On Theories of the Glacial Period, by the Rev. J. E. H. Thomson, B.D., ... 44

MAY MEETING—

On the Heading Stone of Stirling and some of its Associations, by Dr Drew, ... 57

JUNE MEETING—

On Ancient and Modern Art in relation to Architecture, by Mr J. Allan, ... 65

SEPTEMBER MEETING—

On the Antiquities of the East Neuck of Fife, by the Rev. W. F. Goldie, ... 81

On the History of the Potato, by Mr G. M'Dougall, 91

OCTOBER MEETING—

Secretary's Report, ... 97

Treasurer's Report, ... 98

President's Address, ... 98

Office-Bearers for 1887-8, ... 102

STIRLING NATURAL HISTORY AND ARCHÆOLOGICAL SOCIETY.

The monthly meeting of this Society was held in the Smith Institute on Tuesday, 2d November—the Rev. Mr Goldie presiding. The Chairman briefly introduced Mr A. F. Hutchison, M.A., rector of the High School, who read a paper on "The Napiers of Edinbellie-Napier and Culcreuch." At the close, a hearty vote of thanks was, on the motion of Mr Goldie, seconded by Dr Drew, conveyed to Mr Hutchison for his very full and interesting paper—especially interesting because local—and the hope was expressed that if Mr Hutchison had any more material of a similar kind lying by him, he would lay it before the Society at no distant date.

Mr Sword, curator of the Smith Institute, showed a series of beautiful ornithological exhibits, remarking *en passant* on the habits of the different species. The exhibits included the Capercaillie, *Tetrao Urogallus*, male and female; Blackcock and Greyhen, *Tetrao tetrix*; Ptarmigan, *Lagopus Mutus*, male and female, autumn plumage; Ptarmigan, male and female, winter plumage, locality—Ben Lomond; Red or Common Grouse, *Lagopus Scoticus*, male, first plumage, male and female, adult plumage. They are all splendid specimens of the taxidermist's art, and will form a very valuable addition to the ornithological department of the museum, which is growing rapidly under Mr Sword's care. Mr Kidston exhibited specimens of sigillaria—a fossil tree or gigantic club moss found in the stone quarries of Messrs Murgatroyd & Sons, Clayton, Bradford, and considered the largest and finest fossil known. A photograph of the roots as discovered was shown, and sections of the stem were exhibited under the microscope. Votes of thanks to Mr Sword and to Mr Kidston, and to Mr Goldie for his conduct in the chair, concluded the business of the meeting. Mr Sinclair, Parkhill, Clarendon Place, has been appointed secretary to the Society.

THE NAPIERS OF MERCHISTON.

Large possessions in the parish of Drymen, as well as in the neighbouring parishes of Balfron and Fintry, were held by the Napiers of Merchiston—a family which, in the sixteenth century, produced

several distinguished men of science, and especially the greatest of all Scottish mathematicians, the famous inventor of logarithms, and, in more recent times, can boast a great array of historical names. A charter under the Great Seal, dated 22d February, 1494-5, gave to Archibald Napier a grant of "the lands and mill of Gartness, the lands of Dolnare. Blareour, Gartharne, the two Bollatis, Douchlass, Edinballie, &c., with the woods and forests thereof, and the fishings of the waters of Anerich and Altquhore, in the Earldom of Levenax, and shire of Stirling." These and other lands in the neighbourhood belonging to Napier, formed the fine "barony of Edinbellie Napier." From this Archibald Napier, the third in descent was Sir Archibald of Edinbellie and Merchiston, the Master of the Mint to James VI., or, as the style of the office then ran, "General of His Majesty's Cunzie House." This Sir Archibald was a notable man iu the reign of James VI., and may even yet be recalled with some interest. Besides his practical skill in the arts of assaying and refining, he was great in mathematics, and an enthusiast in such chemical science as was then pursued in the form of alchemy, by which philosophers sought a method of producing gold and other precious metals by artificial means, and although they did not find that, yet did make discoveries which have been of no little value to modern science. Archibald Napier was appointed to "his Hieness' Cunzie House," in 1582. Twenty years previously to that he had been sworn into the office of Justice-Depute of Scotland in the presence of the Justice-General, the Earl of Argyle, who held that office by hereditary right. Napier's co-justices were Craig of Riccarton, the well-known writer on Feudal Law, and Stirling of Keir, to whom he became more closely allied by the marriage of his son with Keir's daughter. He received the honour of knighthood, along with Sir James Stirling, in 1565. As master of the Cunzie House, Napier had under his charge all the mines of the precious metals in the kingdom, as well as the regulation of the coinage. He was reckoned expert in the discovery of metals, as well as in refining and coining. A work printed at Paris in 1612 affirms that "the Laird of Merchiston got gold in Pentland Hills;" and one of the allegations made against Napier by his opponent, the Parson of Menmuire, is that he had thus discovered mines of the precious metals, and had concealed his knowledge thereof from the king. "I desire your Lordships,"

he says, "to take the General's great oath upon such seams of metal as he has found and known to be in Scotland; of the profit whereof it is no reason that his Majesty and the country should be defrauded by his malicious silence. And if he swears that he knows none I will offer to prove that divers times he has avowed that he knows, and has tentit, a copper seam near to the sea, five miles long, which seam I will be content to have in tack, or any other seam which he has found, &c." Many of the details of this quarrel between Sir Archibald and the Parson of Menmuire are exceedingly interesting, but we cannot go into it minutely here. In spite of the attack thus made upon his abilities, Napier continued in possession of his office, and without any diminution of his reputation. Twelve years afterwards he singularly vindicated his skill in the business of assaying, and other matters relating to the coinage. As the affair is recorded by Sir James Balfour—"On the 10th September, 1604, Napier, laird of Merchiston, General of the Cunzie House, went to London to treat with the English Commissioners anent the Cunzie, who, to the great amazement of the English, carried his business with a great deal of dexterity and skill; and having concluded the business he went for, he returned home in December thereafter." Why the Englishmen were so greatly amazed we are not told. Perhaps they had imagined the Scotch to be merely ignorant barbarians; or it may have been that Napier treated them to some display of his skill in these occult sciences, in the pursuit of which we know he indulged. At anyrate the rumour of the way in which he had "dang" the Englishmen was the occasion of pride among his own countrymen. Worthy Birrell, in his diary, under date 10th September, 1604, records the fact as a matter of general gossip. "The General Maister of the Cunzie House tuik shipping to Londone, for the defence of the Scottis cunzie before the Counsell of Ingland; and the wit and knowledge of the General *wes wunderit at by the Englishmen.*"

Napier married Janet, daughter of Sir Francis Bothwell, a Lord of Session, in 1549, when he himself was but a schoolboy of sixteen years of age. His son John, the inventor of logarithms, was born in the following year. Father and son were thus so nearly of an age, and were so entirely given up to the same scientific pursuits, that they lived and studied together more like brothers than parent and child. Francis, the second son, was Assay Master

under his father, and was associated with him in the protest to the Lords of Council against the appointment of the "Master of Metals."

There are two places in the parish of Drymen for which is claimed the honour of being the birthplace of John Napier, the inventor of logarithms. But whether he was born at Drumbeg, or at Gartness, or at Edinbellie, in the neighbouring parish of Balfron, or at Merchiston, there is not sufficient evidence, documentary or other, satisfactorily to determine. There is no doubt, however, that he frequently resided at Gartness, and in that retirement devoted himself without interruption to his mathematical and theological studies. The House or Castle of Gartness, in which he lived, was close by the Falls of the Endrick at that place. The account of the parish, written forty years ago, says:—"There are still visible some fragments of the ruins of the Castle in which he lived, overhanging the Falls of Gartness. A stone, with the date 1574, taken from these ruins, is seen built into the gable of the mill. The present proprietor (into whose family the estate of Gartness came about a century and a half ago) has in his possession some globular stones, with the circles of the sphere and constellations engraved on them—and concave stones, with engravings of a similar character, which are understood to have been made by Napier. There is also a stone of this kind to be seen, forming one of the *rybats* of a window of the mill. It is very probably to some such handiworks of Napier that Butler in his 'Hudibras' (Part II., canto 3) refers, when he speaks of

> 'A moon-dial, with Napier's bones,
> And several constellation stones,
> Engraved in planetary hour,
> That over mortals had strange power.'

Napier's Bones has reference to an invention of Napier, whereby he contrived, by means of some small rods with the digits inscribed on them, to perform certain operations of multiplication and division. A tract was published in London, 1584, containing 'An Account of the Numbering Rods of the Right Honourable John, Lord Neeper; enlarged. Printed for Joseph Moxson, at the sign of the Atlas, in Ludgate Street; where also these numbering rods (commonly called Neeper's Bones) are made and sold."

We can scarcely doubt that the work which engrossed the attention of Napier at Gartness was the perfecting of his logarithmic calculations. From 1590, when we reckon he first settled here, till 1614,

when he gave his discovery to the world, he must have frequently stayed in Gartness House. Whether he brought the idea with him in 1590 we cannot say, but there is evidence that he had clearly conceived it as early as 1594. In that year, according to a statement in one of Kepler's letters, "*some Scotchman*, writing to Tycho Brahe," (the famous astronomer) "held out a hope of the *Canon Mirificus*," the name which Napier gave to his invention. This Scotchman was, therefore, probably Napier himself. It is even possible to trace, with some degree of certainty, the very person who was the medium of communication between the Scottish and Danish philosophers. This appears to have been Dr John Craig, physician to King James the VI., a learned mathematician, and a friend to Napier, as well as Tycho, who is ascertained to have visited the latter in that year. Craig was the son of that Sir Thomas Craig of Riccarton, who has been already mentioned as colleague to Sir Archibald Napier, our philosopher's father, in the office of Justice-Depute of Scotland. Between 1594 and 1614, therefore, Napier must have been much employed in working out his discovery, and completing his calculations. His father, the "General of the Cunzie House," died in 1608, but he himself was not served heir to Merchiston until 1613, owing to some disputes with other members of the family regarding the succession. During this period, therefore, immediately preceding the publication of his work, it is possible that he may have been much at Gartness. His succession to his father in 1613 accounts for the designation "Baron of Merchiston," which appears on the title page of his "Canon Mirificus," published in 1614. In the epistle dedicatory to the "Plain Discovery of the whole Revelation of St John," dated the 20th day of January, 1593, he styles himself "John Napier, Fear of Marcheston," because he held, what Scotch Law terms the *fee* of the barony during the lifetime of his father, who was the actual proprietor or baron.

Besides his great discovery, the restless mind of Napier applied itself to innumerable problems and speculations in mechanical science—some of them of greater ingenuity than utility. Among his many projects we hear of one for utilising not only the heat of the sun—as Archimedes centuries before had proposed to do—but also artificial heat from fires, by means of lenses or mirrors, for setting fire to the ships or other works of an enemy; a cannon

of such description as to fire in several directions at the same time ; a scheme for improving poor soil of certain descriptions by sowing it with salt ; and other inventions equally ingenious, and perhaps still more impracticable.

There is no doubt also that, like his father and at least one of his own sons, he was an ardent student of the mystery of alchemy. In this, as well as in his fondness for the study of the more recondite questions of theology, he resembled the great English philosopher, Sir Isaac Newton. And, if we are to regard his search for the chimerical "philosopher's stone" as any derogation from the scientific sanity of Napier, it must be much greater in the case of Newton, who lived about a century later. The researches of the late Sheriff Mark Napier, and his examination of the charter chest of the family to which he belonged, brought to light many curious family documents. Among these is one in the handwriting of the great Napier himself, which gives an account of four separate interviews which he held in the years 1607 and 1608, with one Doctor Daniel Muller, a German adept then living in Edinburgh, who professed to have attained to a complete knowledge of alchemical science. This worthy, who was at the time "diseased of the gout" and "feared himself" (that is, that he was dying), proposed to reveal the whole secret to Napier, "knowing," said he, "that you are a man who fears God and will be secret, and that you will be good to my wife and bairns, in case these diseases will take me away." He then proceeds to give instructions at great length, expressed in the usual jargon of the alchemical philosophers. Napier carefully notes all down, including what the adept said about the triple use of the stone, "first, in transmutation of metals ; secondly, in curing diseases ; and thirdly, it is *lapis divinus*, for magical uses"—which things, "upon his salvation, he affirmed to be true." He notes that he had seen one of the experiments, which occurs at an important stage of the process, successfully performed by his father, but that expert metallurgist had not advanced beyond this in the discovery of Nature's grand secret as Dr Daniel Miller had done. The whole account is exceedingly interesting and curious, but too long to give at length. The operation as directed to be performed by Doctor Muller is described, but in omitting it we are not withholding any valuable secret. Napier himself seems to have been rather more sceptical about some things he was

told than his preceptor liked. One of his sons, however, exhibited, in connection with this matter, a more unquestioning faith than his father. He had quite persuaded himself that he had discovered the great secret, and he left behind him a very remarkable document on the subject, which we shal by-and-by refer to.

John Napier died at Merchiston Castle on the 3d of April, 1617, and was buried in St Giles' Church, Edinburgh. He was about sixty-seven years of age at his death, having been born in 1550. He had been twice married. By his first wife, Elizabeth, the daughter of Sir James Stirling of Keir, whom he married in 1571, he had a son and a daughter. His second wife, Agnes, daughter of James Chisholm of Cromlix, near Dunblane, brought him a family of ten children. At his death, in 1617, he was succeeded by his eldest son Archibald who, ten years afterwards, was raised by King Charles I. to the peerage, by the style and title of Lord Napier—a title which still continues in the family. None of the branches of the family now retain any connection with Strathendrick. The son of the first Lord Napier was that Master of Napier, who was the nephew and friend of Montrose. The elder Napiers had been determined Presbyterians, and while the older and ennobled branch of their successors deserted their ancestral principles and fought for the King and Episcopacy, the younger branch, as represented by Napier of Culcroich, adhered sternly to the Covenant. We propose to pass over the warlike and other exploits of other members of this distinguished race, as but remotely connected with the district, but of this "Master Robert Napier of Culcroich, Drumquhannie, and Bowhopple," and his remarkable legacy to his descendants, we purpose to give a short account.

Robert Napier inherited the religious opinion of his great father, and, along with these, no inconsiderable share of his mathematical ability. Assisted by Henry Briggs, the famous Oxford mathematician, who was an enthusiastic disciple of John Napier in logarithmic science, he published after his father's death, the work in which was explained the method of the construction of the logarithmic tables. This work had been prepared by the father previously, but was not published during his lifetime. The Latin preface was written by Robert Napier. While he was thus devoting much of his time to scientific pursuits, he was not less interested in the state of the country and the cause of Presbyterianism. His

zeal led him to attempt to disengage his nephew, the second Lord Napier, from the party with which he had associated himself, In this, however, he was not successful. When the King (Charles I.) had surrendered to the Scottish army, he thought the time opportune to write to his nephew, advising him "not to adhere any more to his useless courses and ways;" but the young nobleman obstinately refused to take his uncle's advice, writing in reply that "it was ever said that Montrose and his nephew"—the Master of Napier was nephew of Montrose as well as of Culcreuch—"were like the Pope and the Church, who would be inseparable."

This was the man—an able mathematician and a person of settled religious and political convictions—who imagined that he had discovered the secret of the transformation of metals, and who left it as a precious legacy to his descendants, guarded by the most solemn injunctions that they would use it only for the benefit of their fellow-men. The character of the man, and the circumstances in which, as well as the purposes for which, he wrote and bequeathed his manuscript, preclude the possibility of conscious deception. We cannot doubt the good faith of the author. At the same time it does not certainly appear that he claims to have successfully performed the feat of transmutation himself, and there is no reason to suppose that any of his descendants were able, by following his instructions, to attempt it.

Robert Napier left behind a manuscript written in his own hand and in the Latin language, in which he designs to convey to his son, and through him to future selected members of the family, the secret of the art of "multiplying" the precious metals. The work is entitled—"The Revelation of the Mystery of the Golden Fleece; or, a Philosophical Analysis, whereby the marrow of the true Hermetic Intention is made manifest to such of my posterity as fear God. —Robert Napier, author." Appended are instructions in regard to the use which the author desired to be made of his book. The note is worth quoting, as indicating the character of the man. "This book is to remain in my charter-chest, and not to be made known to any, exeept to some neat friend, being a scholar, studious of this science, who fears God, and is endowed with great secreey, not to reveal or make common such mysteries, as God has appointed to be kept secret among a few in all ages, whose hearts are upright towards God, and not given to worldly ambition or covetousness, but secretly to do good, and help the poor and indigent

in this world, as they would eschew the curse of God if they do otherwise.—R. NAPIER." In this charter-chest of Culcreuch, accordingly, this curious manuscript remained until, "some time in last century, William Napier of Culcreuch, Esq., lineal descendant of the said Robert, transferred the whole responsibility to the charter chest of Francis, fifth Lord Napier." Here it was discovered by Sheriff Napier, who, in his "Lectures on Logarithms," has told all that is yet publicly known on the subject.

The preface, a translation of which has been given *in extenso* by the learned Sheriff, sets out with an exhortation by the author to his son about to be initiated "as a son of the art," to fear God with his whole heart, and seek His guidance, which is needed by men in all things, "especially in this divine science, which, even from the Deluge down to these times, the Almighty hath been pleased to reveal only to a very few, and these good men and gifted with Pythagorean silence." He describes in strong language the miseries which would befall the world if this great secret were made accessible to wicked men, so that all would become greedy of gold and and have the means of obtaining it. "Reveal this secret to the vulgar," he says, "and the darkness of chaos must again brood on the face of the waters." Divine Providence, however, had ordained that a knowledge of the mysterious art should never entirely leave the earth since the time of Hermes, the first inventor, but "the majesty of the great mystery has been protected in a cabalistic form." The Hermes here referred to—we may explain for the benefit of those of our readers who may not have given any attention to the history of the alchemical philosophy—is a sort of mystical personage, whose name given in full is Hermes Trismegistus, and who is said to have been the King of Thebes, and a great grand-son of Noah. He was regarded by students of alchemy as the founder of their science, and the first possessor of the master secret. From this time numerous works had been written on the subject but these contrived so to involve the truth in enigmas, allegories, and figures of speech, that only a select few in every age had been able to penetrate to the secret. Napier's object in his manuscript was to collect from the works of the various philosophers the sentences which really contained the kernel of the matter, and to set them forth "in methodical order, so that his son might be competent and

learned, both as regards the process and the material," and might thus be enabled to exercise a general beneficence in alleviating the sufferings and relieving the wants of the poor. The preface concludes with a tremendous denunication of Divine vengeance upon the man who may read the manuscript and reveal the secret to any except "a son of the art—a God-fearing man—and one who will keep the secret of Hermes under the seal of the deepest silence." "If you do otherwise," he concludes, "accursed shalt thou be; and guilty before God of having betrayed his secret to the wicked. Most assuredly the Divine vengenance will light upon your head for all the evils that may thence arise. May my own soul be free from so deadly a sin. My constant prayer to Him is, that this manuscript of mine may by no accident fall into impious hands. And I here call Him to witness that it was collected and written by me solely for the sake of good men, who with sincere and pure hearts worship God, to whom be all honour, praise, and glory, for ever and ever."

As no reader of the manuscript is likely to be much the wiser in regard to the "Secret of Hermes," this awful curse will probably remain ineffective. This work, in fact, so far as it has been described to us, is simply a collection of precepts and sentences culled from the works of many alchemical writers, and resembling the collection of similar extracts, which we know was made by Sir Isaac Newton for his own use when engaged in the same visionary pursuits. Among other adepts whose precepts are quoted it is interesting to find allusion made to John Napier's venerable German friend, Dr Daniel Muller. He is referred to as the author of some Latin verses, which tell of the *Triple key*, by which the Hermetic secret may be unlocked. These verses Napier has taken the trouble to turn into English, and his version may be given here as a specimen of the sort of thing which engaged the attention of natural philosophers in the fourteenth and fifteenth centuries.

A threefold key soon opens me, made of my proper kind;
The *first* lies still in Istria hills, there buried in that mine;
The *next* is wont in Marian mount to lie among the mould;
The *third* is found in Scottish ground, in waters breeding gold;
Thir units three does open me—I fear none other force—
Depart with wealth, leng life, and health, thou opener of my corse.

We know as much as to understand that "thir units three" are the alchemical elements Mercurius (*mercury*), Luna (*silver*), and Sol (*gold*), by the due

admixture of which, under the proper constellations, and with the correct processes and ceremonies, the master metal might be produced.

We have described this curious manuscript at some length, as it illustrates both the character of a somewhat remarkable man and the nature of the science of those times. The search for the philosopher's stone may seem visionary and absurd to us at the present time, but we cannot regard the men who then engaged in it as mere dreamers and fools, when we think that it appeared both real and attainable to men like Newton and the Napiers. It was a ghost that haunted the obscurity of the long dawning of science, and which has disappeared in the clearer light of the present day. But we need not be too proud of our superior knowledge. The *philosopher's stone* is probably not now an object of search to any one, but the twin delusion of *perpetual motion* is still hovering about, and has not yet taken final flight from the region of the possible. Let us say all the good we can of the dead and the dying. Alchemy was the mother of modern Chemistry, and the discoverer of more than one of the methods still in use in the practice of metallurgy and other scientific processes; while we are probably not wrong in surmising that the desire to compass perpetual motion has led to some of the inventions of practical mechanics.

Robert Napier was not a fool, but a philosopher, possessed of that special mathematical talent which is usually considered the most calm and sane of all the forms of genius, and a man of deep religious feeling, strongly attached to a form of worship which is generally considered the most remote from mysticism; while every page of his manuscript shows that none of his researches were directed to purposes of self-enrichment, but that in all he anxiously aimed at the benefit of humanity.

The following paper was read at the December meeting of the above Society by Mr James Lumsden, F.Z.S., Member of British Ornithologists' Union :—

HINTS ON THE STUDY OF ORNITHOLOGY.

The work of an ornithologist is by many so imperfectly understood, that I trust that you will forgive me if I occupy your time this evening by shortly noting some of the chief features of such work, and in making one or two suggestions as to the carrying on of it. The name ornithologist is a most comprehensive one. According to the popular use of the word it is applied alike to the scientist who spends his time in studying the anatomical structure of the various orders of birds, and to the old cobbler who prides himself on the colour of his pet canary, the shape of his pigeons, or the tail of his Spanish cock. At one time we heard of country towns and villages having their canary and poultry shows. Now they are advertised as the "Exhibition of the Local Ornithological Association." An ornithologist, properly so called, is one who studies birds. Some pay special attention to the anatomy and form of the various species, while others study their life-history and habits. As the last is the most popular branch of the study, and the one in which I have most experience, I will confine my remarks to the work of the field ornithologist. First of all I wish to eradicate the popular idea that an ornithologist is a collector, and a collector alone. It is quite unnecessary for everyone who wishes to study birds to make a collection of skins or stuffed specimens, and the converse is also true, for I am sorry to say that there are a large number of collectors who are not ornithologists. In fact collectors who are not ornithologists are just as common as ornithologists who are not collectors. It is not the hoarding together of a large number of specimens—even if they have the advantage of having been shot by himself—that makes a man an ornithologist. I say even if they have been shot by himself, for how often do we see a collection about which the proud owner tells you that every specimen in it has fallen to his own gun, but about which he has no notes, not even the dates of capture. Such a collection may be of interest to him who possesses it, but what, I ask, is its interest, or benefit to the general public? This collection may remind the owner of it of many a happy holiday, spent in pursuit of game or wild fowl, but show it to one who is really fond of the

study of nature, and he will see in it the proof that he is no naturalist, and he will not fail to mourn that so many glorious opportunities of observing and noting the habits of birds have been thrown away in the desire to possess their skins. The owner of such a collection is neither a sportsman nor a naturalist. The true sportsman is nearly always an ornithologist, and it is no wonder that he should be so, for he has opportunities which others do not possess of observing the habits of birds. He may enjoy a shooting trip for other reasons than the killing of game. On a frosty day in early winter when the trees have lost their leaves and the frost has bent the brackens to the ground, the sportsman may be placed at the end of some long wood to watch for game disturbed by the beaters at the other end. The anxious keeper in charge may have placed him there with strict orders to kill everything that comes out. Sometimes, however, the game has been allowed to pass unshot at, as he finds more interest in watching the troops of tits or golden-crested wrens looking for insects in the tender shoots of the oak or fir trees; or the small tree-creeper running its corkscrew path up some large tree, or a robin has perched itself at his feet looking up in his face with all the trusting inquisitiveness of its race. On an occasion such as this we can almost forgive him for forgetting the game. But although sportsmen may have more opportunities of observing the habits of some species than those who do not use the gun, it by no means follows that the study of Ornithology is to be confined to them, and them alone. There are many species, such as warblers and other song birds, the habits of which we may become better acquainted with in an ordinary garden than if we were to wander far over hill and dale. In very many cases a good field-glass is of more use to the true naturalist than a gun. The binocular or telescope should be to the ornithologist what the microscope or magnifying-glass is to the botanist or entomologist. I know fewer more interesting sights than to watch flocks of Waders feeding along the sea coast at low water in spring or autumn. Many a one may look at a long stretch of sand and seaweed and think there can be nothing of interest in that; but if it be the time of the autumn migration let him look with greater care, and by the aid of a glass, he will most likely discover that what looked like an uninhabitable waste is peopled by many a little troop of Waders, Knots and Dunlins, and Sandpipers, running about in the most lively manner, feeding on the small aquatic

insects found among the sand and seaweed. In winter, should the observer live near any large sheet of water, in stormy or frosty weather, he will find much interest in the wild fowl which gather in at such times. Anyone who has not paid attention to the subject will be surprised to find the number and variety of Ducks and Sea birds that are to be found on some of our fresh water lochs during winter. On Loch Lomond I have often seen in one bay Mallard and Teal, Tufted Ducks, and Wigeon, Scaup, and Pochards, with a stray Wild Goose, one or two Cormorants, and hosts of Golden Eyes and Coots, while near the shore would be a pair of Dabchicks, and some Water-hens at the water edge. The great advantage of observing birds with a good glass is that you see them in a perfectly natural state. I have noticed that in trying to get near birds they are often slightly disturbed. And although they may not actually fly away and may even feed on, still they seem uneasy, their acute sense giving them the knowledge of danger near them, although that danger may not be clearly defined. But when viewed at a distance there is nothing of that, and the whole manner of the birds shows that they are at ease. There is one branch of Ornithology at which every one can work, and it is a branch to which lately much attention has been paid, and about which we have lately learned much and are daily learning more. I refer to the study of the migration of birds. The committee appointed in 1880 by the British Association has done much good work. Their plan, as you all doubtless know, is to issue circulars to the keepers of lighthouses and lightships round the coast, asking them for information about all species that may strike the light or be observed passing by it. The strong rays of the powerful lamps used in those lighthouses attract the birds, and in many cases they are killed on the plate-glass that surrounds the lantern. In some instances the velocity of the flight of the bird is so great as to completely smash the very strongest glass. From the information thus received, and from notes from other authentic observers, the members of the British Association committee prepare their annual report. It is a document full of interest, and one I can with full confidence recommend to your attention. The Scottish district is looked after by a well-known member of the society, Mr Harvie Brown, and he is always glad to receive any information on the subject of migration from any thoroughly reliable source. Any one who has sufficient

knowledge of birds can assist in the collecting of information on the subject of migration. All that it is necessary to do is to keep careful notes, with the dates of the arrival and departure of the various migratory species. The whole subject of migration is one of intense interest. It is as yet a comparatively unexplored field, a subject about which volumes may yet be written. From those distant lightships and outlying rocks there comes many an interesting note. And we now know that birds like the Robin and Golden Crested Wren, which at one time were not supposed to leave the country, are as regular migrants as the Woodcock or the Swallow. The old and foolish fables of the Swallow being found in ponds are now exploded and for ever set aside, never again to be revived. Some people may say that they cannot study Ornithology as they live in town and are seldom in the country. It is wonderful what may be done by the city ornithologist. I have often seen notes kept in large towns, and those who have not paid attention to the subject will be surprised to find the number and variety of species that are to be found in even our largest cities. Mr Hating, the editor of the *Zoologist*, has published some interesting notes on the birds of London. And I rather think Mr Campbell, of the Kelvingrove Museum, knows a thing or two about the birds to be found within the municipality of Glasgow. And now I will give town ornithologists a hint. Keep your eye on the poulterers' shops. Poulterers are in the habit of getting birds from far and near, and many a rare Duck or Wader has been picked up in these shops. Some poulterers' classification of birds is very simple. Of Ducks they know but three kinds—"Mallard," "Teal," and "Wigeon," That is to say, that everything that is not a Mallard, or a Teal is called commercially a "Wigeon," and as the so-called "Wigeon" includes many species, such as Scaup, Tufted, Golden Eye, Pochard, Long-tailed, and Pintail, it is among this class that uncommon birds are often to be found. Again, of Waders, there are but two kinds—Snipe and Plover. Everything that is not large enough to be a Plover is a Snipe, provided the bill is a decent length! Among those small birds are often to be found stray specimens of rare Sand-pipers, foreign birds, the arrival of which on our coast it is always interesting to record. There is another branch of the subject that may, indeed must, be studied in towns. It is not a scientific branch, but it is decidedly an interesting and amusing one, and although I feel that it is hardly a subject to talk of

to a scientific society, I trust you will forgive me for mentioning it. It is the "Ornithology of Ladies' Hats." Any careful observer will very soon discover that many of the "beautiful and wonderfully made" birds that we see on the heads of our lady friends, are not to be referred to any order, genus, or species, or are they known, as they now appear, in the Zoological zone. It is not uncommon to find that the head of the so-called "bird" is a native of Africa, the tail from America, the wings from the north of Europe, while the body bears a strong resemblance to the feathers of a barn door fowl! A railway journey often affords one the opportunity of making notes. Many birds seem to get accustomed to passing trains, and many interesting bits of bird life may be seen from a carriage window. In the wilder parts of Scotland we can from the train often identify some of our rarest rapacious birds. I have seen a Kite within twenty yards of the Highland line at Killiecrankie. By the banks of the rivers the Heron may often be seen standing at the side of some shallow pool, and in ponds of rush grown pools we can see Dabchicks and Ducks swimming about, undisturbed by the noise of the train. I would like to say a word on the formation of collections. First of all, collections of eggs. Some people collect eggs of every kind, and from every country. But to attempt a large collection of this kind is to my mind most unsatisfactory. Unless the collector makes the formation of such a collection the business of his life, it is a hopeless task to collect the eggs of the world. In collecting birds or eggs, the private collector should take up either some special species or some special district, and work those well out. In this way a collection becomes of use. Every one has their own plan for keeping the notes of their egg collections. But it must be ever kept in mind that the notes are the most important part of the collection, and that no eggs are of any value whatever which have not been clearly identified. A well known naturalist once said to me, when showing me his valuable collection of eggs, "If the house were to take fire, I would try and save my note books, and would leave the egg shells to take care of themselves." No eggs should be taken without the person seeing the bird go off the nest, and then the bird must be clearly identified. This should be a universal rule, except in cases where there is no possible doubt of the species. Notes of the shape, composition, situation, and any other particulars with regard to the nest should be made at

once in a pocket note-book. As soon as possible the eggs should be blown, one hole only being made, and that carefully done with a drill. A number in ink should then be placed on the egg, referring to the collector's egg book, in which should be copied the notes made on the spot in the pocket note book, and to this may be added any other further information. It would take too long in a short paper such as this to describe at length how to blow and arrange all kinds of eggs, but those who want full instructions on the subject of egg collecting should study Professor Newton's "Suggestions for forming Collections of Birds' Eggs," which gives full information on every point. There is a kind of egg collecting fashionable with some people, which to my mind is of little use. That is the forming of a collection by purchase. I cannot conceive what interest there can be in such a collection. I consider the chief interest in making a collection of any objects of natural history is the opportunities that are thereby afforded to one for observing nature, and of becoming acquainted with many interesting facts that would otherwise remain unnoticed. The prices that are asked by dealers for rare eggs are in some cases very high, while those at some auction sales show the interest that this kind of collecting has for some people. The last eggs of the Great Awk that were sold at Steven's Auction Rooms in London fetched £100 and £107 2s, but of course this is an exceptional case, as the bird being now extinct, many good ornithologists were anxious to possess specimens of such very rare eggs which could only be got by purchase. It is reported that as much as £140 has been paid for an egg of this species, sold by private bargain. In speaking of the Great Awk I am reminded of an incident that came under my notice some time ago, which shows how difficult it is for some people to understand the object of collecting specimens that cannot be put to some practical use. A good many years ago I was one afternoon visiting the curator of a museum in the West of Scotland. He was busy arranging some large plates of birds in a hall at the museum for the purpose of illustrating a lecture on Natural History that was to be given there that evening by an eminent naturalist. While so occupied, an old farmer came in, and stood for some time at the plate of the Great Awk. Turning to the curator he said, "That's a bonnie bird; what do ye ca' that bird?" "That is the picture of a Great Awk," replied the curator. "The bird is extinct now, and specimens of the bird and its eggs are very rare. Indeed, the

last egg of that bird that was sold fetched £64." (This being before the high price before mentioned was obtained.) The old farmer looked astonished, and turning to his informant said —"Do ye tell me so? And did it come oot?" Collections of birds are best kept in the form of skins, unless the collector has a large amount of space at his disposal, and is willing to go to considerable expense in providing suitable glazed cases for his specimens. To attempt to keep stuffed birds without cases is useless. In a very short time they are rendered unfit to be seen if not protected in that way. Private collectors should, if possible, take up some species of birds, and by collecting specimens from different districts, and at various ages and stages of plumage, a most useful and instructive collection can be formed. In this way we learn how much the same species varies under different conditions, and how, what have sometimes been considered different species, are only a variety of the same, the connection between the two being clearly shown by intermediate forms. But what I consider *the* work of the private collector is to collect the birds of his own neighbourhood. It is only by having naturalists making local collections, and of course keeping notes on the species collected and observed, that we can ever perfect our knowledge of the distribution of the birds of our country. All specimens should have a ticket clearly showing the sex of the bird, the date of capture, by whom obtained, the contents of stomach, and as much other information as possible. And in the case of rare birds being shot, it is of the greatest importance that full particulars be recorded of the state of the weather at the time, and if, as is often the case, the stranger should have been found after a storm, it is of importance to note the direction of the wind. Rare visitants are often nothing more than migratory birds blown out of their course during migration, or sea birds blown on to land by the force of a gale. So much for private collections. I would like to say a word about public museums. In a public collection it must always be kept in mind that its chief object is to educate. What I would like to see in every town would be a collection of British birds and eggs arranged so as to show (1) The old birds, male and female; (2) The immature plumage; (3) The young in down or nestling; (4) the egg. Had we public collections such as this, from which all could learn the appearance and names of our native birds, authentic information regarding them would be much more easily obtained,

for we could then trust to nearly every one having at least some idea of the various genus and species of our native birds. I cannot close these rough notes without giving just one word of warning on the subject of collecting notes. It may seem a very hard and nasty thing to say, but it is nevertheless true, that if an ornithologist would be accurate he must believe nothing he is told, unless he has perfect confidence in his informer. In no subject under the sun do people make so many mistakes as about birds. Many people think that they know birds well, and would be very angry with you if you were to tell them that the bird which they insist is a Raven is nothing more than a Rook, or that what they call a Peregrine Falcon is only a Sparrow Hawk. Even the best educated people make the most absurd mistakes about birds, and it is often amusing to observe the assurance with which they will talk the greatest rubbish. Not long ago a graduate of the University of Oxford, and a member of a learned profession, told me after a day's walk in the country that he had been much interested in watching a "brood of Cuckoos" just out of their nest. Some years ago I was told by a man who should have known better that a rare bird had been shot by a friend of his and had been sent to him. I asked him what it was like. He said, "About the size of a grey hen, with a bill like a hawk." I asked to see the bird, and he produced a hen pheasant which by some misfortune had lost its tail! Verily, it is time that the Board School taught Natural History. Mistakes such as these show how very necessary it is to be careful about identification, and in fact to believe only what we see. In the foregoing "hints" I have endeavoured to show that the keeping of notes is the most important work of an ornithologist. It must ever be kept in mind that notes cannot be too minute. Everything is worth noting down, and everything should be put down at once and when fresh on the memory. Delay is the cause of many mistakes, and no naturalist, or indeed any scientific man, whatever branch of science he may be working, should trust to memory. Some people think that Ornithology is a fully worked out branch of Natural History, but the very fact of their thinking so only shows how very little they know of the bird life of the world in which we live, or of the history and habits of

"The birds that fly
Thro' wild expanses of the midway sky."

At the mouthly meeting of the Stirling Natural History and Archæological Society, held in the Smith Institute, on Tuesday, 1st February—Dr Galbraith in the chair—the Rev. J. M. Robertson, St Ninians, was elected a member, and Misses Sheriff and Napier, Melville Terrace, lady associates of the Society. A paper on the drainage of Drip Moss was then read by Mr A. M'Lellan, M.A. An interesting conversation took place, chiefly as to what had become of the large population which was gathered during and after the reclamation of the Moss, from which it appeared that the greater number were gradually absorbed into other pursuits as the small holdings became generally consolidated into larger farms. On the motion of the Chairman, a cordial vote of thanks was given to Mr M'Lellan for his interesting paper. The Secretary then announced that Mr J. W. Small, F.S.A. Scot., would read a paper at the meeting on March 1st on "Ancient Scottish Furniture." The following short notice of excursion to Loch Logan was read by Mr R. Kidston, and specimens of the various plants mentioned were laid on the table for exhibition :—

NOTE OF EXCURSION TO LOCH LOGAN, LECKIE, AND TO THE TOP OF CARLEATHERAN (1591 FEET), GARGUNNOCK HILLS

(By R. Kidston.)

On 23d August last two members of the club visited Loch Logan with the chief object of collecting the water plants. Although the loch (which was artificially made some years ago) was entirely choked with vegetation, so much so that rowing was impossible, few plants of interest were observed. Mrs Whitelaw kindly lent the boat on the loch. *Myriophyllum spicatum*, L, was plentiful and in fine condition. The only pondweeds seen were *Potamogeton pusillus*, L, and *P. natans*, L, which latter had almost monopolised the whole loch. We specially wished to collect the *Characeæ*, but only got a poor and decayed specimen of a *Nitella*, and also examined the *Sparganium*, which flourishes on the edges, in the vain hope that we might meet with the new species lately described from England, but only found the common *S. ramosum*, Huds. At Leckie we also collected *Hypericum tetrapterum* Fries, and in the wood close to the loch, *Milium effusum*. In the tarn at the top of Carleatheran, the Mare's-Tail *(Hippuris vulgaris*, L*)* was plentiful. The occurrence of the following plants may be noted :—*Erysimum cheiranthoides* Linn. Mr Moyes called my attention to the occurrence of this plant

on the new part of the road immediately opposite Ravenscroft. It is difficult to account for the sporadic appearance of plants which do not grow in the neighbourhood, and are not likely to be cultivated in gardens. *Sparganium simplex*, Huds—in a ditch near Ochtertyre, near Stirling; collected by Col. Stirling. I am not aware that this plant has been previously found in our district. *Sparganium minimum* Fries—in small stream, Earl's Moor, collected 10th September, 1881.

THE DRIP MOSS.

(By A. M'Lellan, M.A.)

In this short paper I propose to shew how it has come about that (as one of my authorities has it) "an extensive district where only snipe and moor-fowl were formerly obtained, was converted, as if by magic, into a rich and fertile carse." Kincardine Moss was part of a series of unproductive flats that about the middle of last century occupied the Doab between the rivers Teith and Forth. It began about a mile from the confluence of this stream, and had an area of nearly 2000 acres. Its width varied from one to two miles, and it extended in length about four miles. So uncertain was the surface that it formed an almost impassable barrier; communication between the rich lands on either side being practicable only by a circuit of several miles. For centuries its margin had been resorted to by farmers for fuel and for a top-dressing of doubtful value for modifying the tenacity of the carse clay of their fields. At various points the subsoil had been reached, and the average depth of the deposit had been estimated at about seven feet. In these excavations a Roman camp kettle, traces of a Roman causeway, and trunks and roots of axe-hewn trees had been met with. It was evident that the bog had developed within historic times, and that before its formation the legionary troops of the Roman Empire had advanced into the forests that then covered the wide valley of Monteith. The clay upon which the mossy material lay is of the same consistence, and has the same origin, as that which forms the rich lands of the lower Forth valley. Oaks and birches—many of them of considerable size—had flourished in it, and had contributed to the formation of a virgin soil, on which grew a variety of plants, among which heaths predominated. The whole forest had been cut down; the trunks had been allowed to lie as they had fallen; and the Caledonians permanently dis-

lodged had retired to the fastnesses of the Grampians. A writer in the Philosophical Transactions says :—"The Romans under Ostorius having slain many of the Britons drove the rest into the Forest of Hatfield in Yorkshire, which at that time overspread all the low country ; and the conqueror, taking advantage of a stormy south-west wind, set fire to the trees and when the greater part were thus destroyed the Romon soldiers and the captive Britons cut down the remainder, except a few large ones which were left growing as remembrancers of the destruction of the rest. These single trees did not long stand the action of the winds, but falling into the rivers intercepted their currents and caused their waters to rise and flood the whole flat country, hence the origin of the moss and weary moor-bogs which were afterwards formed there. A similar destruction of the portion of the great Caledonian Forest which shades the upper and middle districts of the valley of the Forth is said to have occasioned the formation of the great bog along the centre of that river valley." A careful examination of the structure of the moss reveals the history of its growth. To the virgin soil, which has an average depth of nine inches, succeed three distinct layers of peat—composed severally of bent grass, sphagnums, and heaths. Marsh bent-grass grows abundantly in moist woods where it frequently attains the height of five feet, and would find a suitable habitat in the overthrown Caledonian Forest. Just as it was succumbing to the rising waters of the stagnant marsh, the broad-leaved sphganums would take its place and must have continued to grow until another addition of three feet had been made to the depth of the bog. Little channels would gradually be formed athwart this soft substance by the steady flow of heavy rains ; and when these deepened they would render the face of the mossy expanse drier than before, and occasion its becoming a congenial soil for the growth of heaths. The upper and middle layers were of little use as fuel, and having resisted putrefaction were incapable of supporting vegetable life. Beneath the peat lay the soil that was known to be productive, and that would yield golden returns to those who could solve the problem of reaching it. Unfermented peat is known to be specifically lighter than water. Was it not possible to float away the whole moss except the heavier portion which might be utilized for fuel and for which a profitable market might be found ? About 1500 acres belonged to the estate of Blair

Drummond, and of this number from one to two hundred acres had already been cleared by tenants of farms lying adjacent, when in 1766 the estates passed into the possession of Lord Kames, who had in 1741 married the sister of the late proprietor. Having frequently had opportunities of examining the position and structure of the moss, he was of opinion that the experiment of getting quit of the vegetable growth of centuries was worth attempting. No time was now lost. He bought up the interest of a corn miller in his lade and engaged workmen by the day and by the piece to float off the moss. When several acres had been reclaimed by this method he discovered that a sum of no less than £20,000 would be required to complete the work; yet by the exercise of ability and resolution he eventually succeeded in surpassing his own sanguine views, with no loss to himself, with little outlay of capital, and with much advantage to those who co-operated with him. He ceased employing labourers. He looked around for tenants. Very attractive offers were made to men who would engage to remove the useless soil at their own time and charges. His ideas were scouted. No one saw a sunny side to the adventure as he did. Practical farmers treated the matter as a chimera and a dream. To settle down as a moss farmer was to court scorn and obloquy. Draining, however, and top-dressing with carse clay had failed to make the soil of this bog productive. Farmers had retired from the attempt in despair. Its existence was an eyesore to the man who had for years played the part of a successful farmer on his own estate in Berwickshire. An anecdote is told of those days, which throws some light on this conceiver of chimeras. One day a county gentleman of his neighbourhood coming to dine with him at Kames found him in the field hard at work in assisting his men to clear the stones from a new enclosure.

"Rident vicini glebas et saxa moventem."

It was after his promotion to the rank of judge. His neighbour attended him for some time with labouring steps and much inward impatience till summoned by the bell for dinner. "Well, my lord," said he, "you have truly wrought for your meal. Pray let me ask how much you think you will gain by that hard labour at the end of the year?" "Why, really, my good sir," replied the other, "I never did calculate the value of my labour; but one thing I will venture to assert—that

no man who is capable of asking that question will ever deserve the name of *farmer*." The plan adopted by Lord Kames may be thus sketched. The heath-clad waste was to be divided into eight-acre allotments, and no tenant could take up or hold more than one at a time. The tack or lease was to be for 38 years. The tenant was to clear away the peat and build his dwelling and make the most of the reclaimed clay subsoil. The proprietor would supply the necessary water and wood, and give the tenant as much as two bolls of oatmeal on entering. He would expect no return whatever during the first seven years of the tenancy. The rent during the eighth year would be 13d per acre, and year by year an additional merk was to be paid until the close of the first 19 years of the lease. From the 14th to the 19th year, however, a hen was to be looked for in addition. During the second series of nineteen years the unvarying rent would be 12s 6d per cleared acre, besides 2s 6d for each acre not cleared and two hens. This was a style of farming hitherto unprecedented. It was the story of the treasure hid in a field which was found after many efforts with the spade. In 1767 one tenant appeared and the moss-farming scheme was on its trial. A trench two feet wide was dug through the moss and into the sublying clay, with a fall of one foot in a hundred. The clay was retentive and perfectly free from stones or any foreign body that might cause obstruction to the material that was being floated away. A sluice admitted water from the mill-race to which I have referred, and the trench was continued down to the channel of the Forth. When the workman commenced operations he measured off a distance of ten feet, the distance within which a spadeful of such light material could with ease be delivered into the trench. When the whole belt was removed another trench was run riverward at the foot of the moss bank, the water was turned into it, and the laborious operation proceeded anew. It is apparent that for many a day there could be no return. Three roods or at most an acre per annum was the extent that could be cleared and prepared for tillage. Houses of wood and turf had to be built somewhere on the allotments—trunks and roots of trees had to be removed. The task was more serious than a backwoodsman's, and less hopeful. Men were found willing, however, in the long run to risk their little all in the enterprise. Plot after plot was taken up. Crofters from Balquhidder

and the adjacant Highland valleys — expatriated clansmen eager for a settled abode— even skilled handicraftsmen who longed for the independent life of a peasant farmer, became claimants for strips of unproductive moss. Before the second year had closed there were eight tenants at work. In seven years the number had risen to thirteen; while at the close of the fifteenth year of the experiment there were 336 acres of the morass in the hands of 42 families. By this time increased water supply had been obtained; even tenants had studied the construction of reservoirs; productive crops had been raised; brickworks had been started as an industry; and brick buildings began to take the place of the primitive though picturesque heather-clad hovel. The valuable section of the moss had been utilized as fuel and hawked for sale in every town and village within easy reach. Portions of the crop were for sale, and comfort had at least come to console and gratify the toilworn adventurers. The little colony was composed of the most promising materials. Nine-tenths of the settlers were Highlanders accustomed to want and the pinching cares of a precarious and even hopeless existence. But they had the virtues of the Celt—sunny hopefulness, love of their homes and of their language, and haughty independence. This life suited them. They clung to and aided one another. They had their happiness in their own making, and one common end in view. Frugality, honesty, self-respect, mutual good feeling, and moral restraint were their characteristics. In 1783, Lord Kames died, but the work which he had inaugurated was not intermitted. The larger section of the moss, an area of 1000 acres, was more or less of the species that has appropriately been called "flow moss." Mr Home Douglas had his heart in the work and was resolved at no matter what outlay to clear away the whole deposit. The first step was to cut a road through it down to the clay 12 feet broad and 2670 yards long. This immense mass of over 20,000 cubic yards of matter disappeared into the Forth, and an extraordinary effort was made to get an abundant and constant supply of water from the Teith to meet the demands of the new tenants who were now eagerly demanding allotments. During the next three years 440 acres were disposed of to an additional 55 tenants. Every effort was made to introduce an abundant supply of water. An Alloa mill-wright erected an ingenious application of the Persian wheel which was capable

of discharging 40 hogsheads per minute through two feeding pipes that were led underground for nearly a quarter of a mile to the aqueduct that communicated with a reservoir constructed on the surface of the moss. By this means a quantity of water, sufficient to give constant employment to forty men, was supplied. Every streamlet was taken advantage of and economised, and every rain shower carefully husbanded, so that as many as from 50 to 60 persons might have been seen at one time briskly engaged in the task of moss-flowing. Old tenants were allowed to sell their leases and take up new eight-acre allotments on the same terms as formerly. As long as it was possible to find a sufficiently firm foundation for a dwelling, the exchange was insisted on. When, however, as happened with the worst portion of the flow moss—a safe site could not be found—old tenants were permitted to remain in their holdings until one acre of the new allotment had been cleared. This plan was found to work admirably. The most energetic and skilful had an opportunity of converting labour into capital. The moss-flowing went on apace. Women took part in it and preferred it to the labour of the spinning wheel. Moonlight was utilised, and as the proprietor now advanced as much as £12 during the clearance of the first acre, there was no inducement for idleness or despair. Between 1774 and 1792 no fewer than fifty of these lease sales had taken place, realizing the handsome sum of £849. As I have said, a beginning was made with one tenant in 1767. In May, 1796 (or within a period of thirty years), the population residing on the Moss had increased to 764 persons. Four hundred acres had been reclaimed, and 102 substantial brickhouses had been erected. The measure of comfort enjoyed by these settlers may be inferred from the statement that they owned 201 cows or, on an average, 1 cow to every 4 persons. By the end of the summer of 1805 the number of acres cleared and rendered arable was 606, and there were 720 inhabitants residing in 169 houses. As Sir John Sinclair remarked—"A tract of ground so considerable, formerly a nuisance to the country, thus converted into a fertile field filled with inhabitants comfortable and happy, cannot surely be surveyed with an eye of indifference by any person whose mind is at all susceptible of feeling or of public spirit." Very much was done by Mr Home Drummond towards inducing the tenants to make speed with their improvements and be proud of their settlement. (1) An excellent road,

a mile and a half long and twenty feet wide, was driven right across the Moss, giving easy access to two portions of the estate that had not hitherto been accessible from either side by a direct route. This work was executed by the tenants at the expense of the landlord. (2) The colony was divided into six districts, and premiums were annually given to the most successful tenants in each. Many ploughs, harrows, and spades, were in this way distributed. (3) A provision was made by which religious instruction through the medium of Gaelic was regularly given, and a good education placed within the reach of every child in the colony. In 1793 the Society for promoting Christian Knowledge, having agreed to co-operate with him, Mr Home Drummond, was enabled to complete his arrangements. The master, besides a salary of £15, had the use free of a school-house and dwelling-house, and had as perquisites a cow's grass, a garden, and one acre of good carse land. He knew both English and Gaelic, and was to convene the people to the school-house on Sundays, say prayers in their own language, and instruct them in the principles of religion. I do not purpose tracing the history of this remarkable experiment further, nor shall I allude to the social problems it involves. I choose rather to close my narrative at a point when it may well be said that "on a district which in 1760 was valueless to the proprietor, and that could scarce even feed anything but a moorfowl, there existed in 1805 a colony of industrious, virtuous, and happy people."

The monthly meeting of the above society was held in the Smith Institute on Tuesday, 1st March—Dr Galbraith presiding. The minutes of former meeting were read by Mr Sinclair, secretary, and approved of, after which the chairman introduced Mr J. W. Small, F.S.A., who read a highly interesting and exhaustive paper on "Old Scottish Woodwork." The paper was illustrated by a wealth of original sketches, photographs, and engravings, which were hung round the room for the inspection of members. At the close, Dr Galbraith in moving a hearty vote of thanks to Mr Small, said we were all more or less lovers of the beautiful in woodwork; we all admired beautiful pieces of furniture and wondered at the skill of the old artists who moulded their lines. Mr Small showed not only deep knowledge and taste, but a genuine enthu-

siasm and lively love for this branch of antiquarian study as well as an ardent resolve to let no obstacles stand in his way in carrying it out. He was moreover pleased to hear him vindicate the reputation of the old Scotch artists as originators rather than copyists. Ex-Dean of Guild Shearer, who seconded Dr Galbraith's motion, expressed the obligation of the society to Mr Small for the great thought and pains he had bestowed on his paper, and for the numerous and elaborate drawings he was kind enough to show by way of illustration. He was glad to find that wood-carving was again coming to the front, and that the ladies of Stirling were now busy at work, following in the footsteps of the old artificers. Mr Small was now settled in Stirling, having established an Art Furniture Factory in the Cow Park. He would be a great acquisition to the town both as encouraging labour and cultivating that fine taste for the beautiful and artistic which was so much to be desiderated. He hoped the members of the society would accord a hearty vote of thanks to Mr Small as an expression of their satisfaction for his very able paper. This was accordingly done. A vote of thanks to the chairman, on the motion of the Rev. Mr Ormond, concluded the business.

OLD SCOTTISH WOODWORK.

(By Mr J. W. Small, F.S.A.)

INTRODUCTION.

Before going into a description of our old Scottish woodwork, perhaps I may be pardoned for saying a few words on old woodwork in general, and may preface it by stating that the most of my studies amongst old furniture have been more of a practical nature than historical, and my rambling remarks will partake more of the former than the latter. Woodwork in the form of buildings and furniture has existed from time immemorial, and in tracing back to find out the oldest record of woodwork, I found it stated that the oldest relic of furniture in existence was the chair of St Peter at Rome. But this is not so. In this country may be seen chairs and stools thousands of years older than the chair of St Peter. I refer to the veritable examples of old Egyptian furniture in the British Museum from the rudest stool to the most elaborate inlaid and carved chairs, and small jewel boxes. It is most interesting to compare the turned work of an Egyptian turner contemporaneous with the rule of our well-known prime minister, Joseph, with the

work of a modern turner, and very little difference can be traced, the same rounds, and fillets, and hollows are alike familiar to both. The construction seems much the same as we do now. The inlaid work and its mitring look as well done as we could do, and the principal material used in inlaying seems to have been ivory, plain and coloured with red, blue, and orange dyes. The mortice and tennon are used to join pieces together, and are fastened with wooden pins; the seats of the chairs have been formed with plaited cords much the same way as we plait the cane now-a-days for bedroom chairs, others have had strips of cloth or skins of animals stretched across the seats. From paintings and incised tablets, examples of similar seats to those shewn in the wood may be seen, and from one on a painting, in the form of a folding chair with a tiger's skin cover as a seat, evidently of ebony with inlays of ivory, called the chair of Ha, scribe to the Royal Granary, an example which we may also claim to date with the time of Joseph. I claim these examples to be the oldest pieces of woodwork in existence, and it is a miracle that we have them still, as they cannot be less than three or four thousand years old, and had they not been buried out of sight in the tombs of their original owners, they would have gone the way of other old furniture of ancient date, furniture being generally constructed of wood is so easily destroyed both by fire and natural decay that it is no wonder that very old examples are scarce and rare. But to come back to our own country of Scotland, and enquire for the oldest bit of furniture or woodwork in existence. I cannot venture to produce a piece of contemporaneous date with those we have had under review, but I believe the oldest representations we have of furniture are to be found depicted in our Celtic and runic crosses, and one of the best examples of their crude forms is to be found in the Dunfallardy Stone near Pitlochry, in which we have two specimens of arm chairs, possibly of the turned wood examples of the Norman period, examples of which can be seen in the Bishop's Chair at Chester. An imitation of which, but which cannot be earlier than the 13th or 14th century, is to be seen at Darnaway Castle, Elginshire, said to have been brought from Pluscardine Priory in its near neighbourhood. But I am afraid we cannot point to any old Scots woodwork at present existing which can go further back than the middle of the 15th century. The state of our country from the

13th century was certainly not at all favourable to the preservation of easily destroyed wooden furniture; the wars of independence of 1269 date, when, as we are told, the English army "sacked, razed, and burnit" all the chief towns and baronial residences in their march, would be a bad time for our old Scots furniture. It is also on record that a repetition of this same sad story occurred in 1544, when Lord Hertford's English army invaded Scotland. Notwithstanding this black record, we can still point to a few examples of old Scots woodwork anterior to the latter date. In the beautiful stalls and carved work in King's College Chapel, Aberdeen, so beautifully depicted in Billings; in Tain pulpit; in the choir stalls of Dunblane Cathedral in our own neighbourhood, with their quaint miserere carvings; in the choir screen of the little parish Church of Fowlis near Dundee, showing the simplest form of the linen pattern panel below, and the rich traceried panel work in the panels above, filled in in the upper half with small square buttresses and crocketed pinnacles; and in the press from the United College, St Andrews, on the ends of which the simple ribbon pattern panel also appears, the front forming two cupboards, the whole front filled in with 12 panels carved with a characteristic form of conventionalized foliage, peculiar to this country, as may be compared with the stone carved work of our old buildings of this period. An example of wall panelling of a corresponding date to the former articles was discovered at Montrose a few years ago. The panels were filled with carvings of an exactly similar kind to those of the St Andrews press. The carvings of some of the panels were also identical with the stone carvings to be seen on what remains of the old fountain in the centre of the courtyard of Linlithgow Palace. I have also seen a door, said to be from St Andrews, of a similar kind, in the possession of the late Mr Paton, Dunfermline. It is a favourite theory, I might go the length of calling it a superstition with a great many persons, that what remains of our old woodwork has either been imported into this country from the Continental cities, or been made here by foreign workmen imported for that purpose. I hold quite an opposite view of the matter, and as far as I can see, the great proportion of our old woodwork is of native conception and native construction. Our native architecture has its peculiar and characteristic features which are unmistakeable, and our old woodwork follows suit. In our designs,

and more especially in the details of our ornamental carvings and mouldings, the chief native characteristics can be seen, which although having a certain resemblance to the same forms employed in English, French, Dutch, and Italian woodwork, can still be placed as not belonging to them. Of course I do not mean to say that all our old woodwork examples are native, some of them no doubt have been imported from abroad; it could not be otherwise considering the large trade that Scotland did with the Low Countries and France, but these foreign examples will be limited to small articles, such as a table or a cabinet. I may say that I began the study of our woodwork with a similar idea, that it was of foreign workmanship, but working up examples of woodwork in connection with our old buildings, of what I would call *fixtures* and which could not possibly be imported, noting the richness of the mouldings used, and the style and kind of their carvings and other details, and finding the same in the detached pieces of old furniture such as presses and chairs, &c., I was forced to the conclusion that the popular notion was wrong and that our forefathers were themselves the makers of their furniture and had no need of foreign legs to stand upon. I have divided the examples I mean to describe into two classes, ecclesiastical and domestic, and will take up the former first.

ECCLESIASTICAL WOODWORK.

By far the largest number of church articles remaining are pulpits. The oldest is the example from Parton, Kirkcudbrightshire, which has a date upon it, viz., 1598, which is a very valuable point for us. It is at present preserved in the museum of the Society of Antiquaries. In plan it forms $\frac{2}{3}$ds of an octagon with one of the sides forming the door, which has plain panels with linen pattern ornament worked hereon. All the other exposed sides are richly carved. The back is formed of 3 long panels with carved running ornament. The canopy takes the form of the plan, with quasi-Gothic pinnacles at its corners and semi-circular panels between, the one facing the front carrying the following inscription :—"Feir the Lord, and honour his hous:" The lettering is good, the panel to the right has been broken half away, but luckily the most important part—the date before mentioned—has been preserved. At Falkland Palace there is the remains of an old pulpit and canopy. The pulpit has been semi-circular in plan, with plain stop chamfered framing

and fielded panels. In the Douglas Room in our own Stirling Castle there is a scrap of a pulpit said to have been John Knox's; but it may be remarked here that the most of our old pulpits have this legend attached to them. This example is in a very dilapidated condition. It had been two-thirds octagon in plan, high panelled back and canopy, all moulded and chamfered, with no carving, the section of the mouldings being particularly sweet and soft. We also boast another John Knox pulpit, which Billings shows in his interior view of the old churches, but which is now preserved in the Guild Hall. It is semi-circular in plan, of oak, and is more ornamental than the last two examples. In the Church of the United Colleges of St. Andrews is perhaps our best example of a pulpit; it forms a magnificent piece of woodwork, and consists of a pulpit, semi-circular in plan, with high panelled back, canopy amissing, precentor's desk in front, with old sandglass stand, and baptismal basin bracket. The floor of pulpit is about 3½ feet from floor. This example is also of oak, and exhibits some good Scots carving and beautiful surface mouldings. The turned balluster is also introduced here, in the side rail between front of precentor's desk and pulpit. Although very much abused in modern work, it is still a useful adjunct in design when sparingly used. In the Antiquarian Museum there is preserved a plain oak pulpit from St Giles Church, octagonal in plan and having a high back, no canopy. In the parish Church of Pencaithland is an old oak pulpit octagonal in plan with carved panels of the usual strap or pattern. The next example of an oak pulpit is from Lyne Church, Peebleshire, is semi-circular in plan with pilasters dividing it into compartments, and date 1644. In the Free Church in Pluscardine Priory near Elgin is a late example of an old oak pulpit dating 1684, which originally was erected in St Giles Church, Elgin. It is octagonal in plan with back panels and canopy and precentor's desk in front; it may be of interest to note that the cost of this pulpit was originally £244, but was bought for £5 in 1826 by the then Lord Fife and placed in Pluscardine Priory; here also we have good iron-work in the sandglass stand and baptismal bracket. Of a similar date to this is the next example from the Parish Church of Aberdeen. In old Machar Church, Old Aberdeen, is also found an example of an old pulpit.

The next important piece of church wood-

work was the gallery fronts or "Lords' Lofts" of the 17th century; the finest example of which is that at Kilbirnie, a small parish church in north Ayrshire. The gallery proper consisting of a front part for the Lord of the Manor, a back gallery behind partitioned off from the front with panelling and fret work on top and 5 fluted pillars, for the servants, and another box with a fretted partition through which the occupants have a peep-show view of the minister. The gallery front proper consists of small pillars which form it into panels, each filled up with a coat of arms. The whole of the work is particularly rich in carved detail, the cornice running round inside being particularly so, also the ceiling of front gallery, and the end of gallery next the church which is filled up with an imitation of spiral columns, carved on the flat, and a representation of St Andrew with the national motto — "*Nemo me impune lacesset.*" Two of the panels of the front gallery had been filled up with paintings, one of which still remains *in situ*, and represents Moses. In this church also there is an old pulpit, a late attempt after the style of the old "Lord's Loft," but a great way after it. There is also a gallery front here of the Chippendale period, with the fretted work of that style introduced and the ground painted black. In Bowden Parish Church is another example of a "Lord's Loft," supported on 3 pillars, and having a front of panelled work pilasters and arches with coat of arms in centre. From New Pitsligo we have another example of this style of loft. The whole of the panels, panel mouldings, pillars, frieze, and cornice of gallery front are covered with carvings. The pilasters and their trusses both in the die and frieze portion are also elaborately carved, the cornice and their pediments following out the same rich effect obtained below. A most valuable point received here is the date 1634. The whole of this piece of work is an exquisite example of our old Scottish woodwork. In the present Parish Church of Dunfermline are remains of an old gallery front of the 1600 period, but only a few panels remain. As a late example may be mentioned the gallery fronts in the old church at Perth, dating from the Adam's period, of very fine detail and ornament. In Logierait Parish Church will be found another example of this period of a gallery front and pulpit, not so elaborate as the Perth example, but still refined in detail and simple, the pilaster in the gallery front being orna-

mented with a cast brass enrichment filling up panel in the form of dropping leaves. The pulpit is enriched in a similar way, and the effect which at first description of it might seem rude and glaring, has a very quiet and charming effect. The Parish Church of Burntisland has also an example of an old gallery front and pillars supporting same. The front is plain with pilaster and segmental arches all round. Here also we find examples of old pews. Here also is a unique example of seats for the Town's Magistrates, the date of which we get from the inlaid work of frieze as of 1606. The seat encircles two sides of one of the four massive piers which rise in the church to support its centre tower, and is, as usual with the woodwork of this period, covered with inlaid work in yellows, browns, and blacks. In Crail Parish Church can be seen a number of varieties of wall panelling, or, as I rather think, of old pews. On one of them we have the date 1605. On another piece of framing is the date 1594. Collection stands are not numerous. There is one here at Crail, also one at Dalmeny Church, but they have plain turned legs and rails.

DOMESTIC WOODWORK.

I will now take up examples of Domestic Woodwork, and will begin with part for the construction, as we might say of the house itself, viz., the

WALL PANELLING.

This was the recognised way of the 16th and 17th century of decorating the walls of the chief apartments of the house. A fine example of this is to be found in the old burgh of Culross, on the Firth of Forth, in an old building there at the Cross called the "Study," having the date 1633 in inlaid work in its frieze. It had gone round the room, the walls of which are not high, about 8 ft. 6 in. or thereby. The wall had evidently first been lined with board ¾ inch thick of oak, from floor to ceiling, on this was fixed pilasters about 4 feet apart, carrying main cornice, enriched under with inlaid work in panels carrying ornamental work and initials and date. This main cornice, which stood about 6 ft. 6 ins. from floor, also formed a shelf on which the old brass plates and delft ware of the time could be seen to advantage. Above the main cornice were other pilasters placed immediately over those underneath carrying the main cornice. The details of this work are particularly good, the inlaid colour being the usual blacks and yellows. The old inn of this town has its "fore" room also panelled, but of a later date

than the "Study," the pannelling being about 8 ft. 6 ins. in height. In another old house called "The Palace" is an example of late panelling in the late addition. In John Knox's House, Canongate, will be found old panelling of a somewhat similar design to that of the "Study," Culross. We find there the same large boards forming the ground with fluted pilaster, elaborately inlaid frieze in yellow and black and cornice. Another example of panelling from Edinburgh Lawnmarket still remains. It stands about 8 feet high—the fire-place being most effective. Two pilasters run up at each side of fire-place from floor to ceiling, the space between being filled up with the moulded stone and wood jambs of fireplace, ogee frieze, heavy cornice of mantlepiece with panel above, which very probably contained an oil painting. In Preston House, Cupar-Fife, the dining-room is all panelled with plain panelling, the fireplace being somewhat like the one described. In the panel above the mantel shelf was discovered under several layers of modern paint a beautiful old painting. The old panelling before-mentioned as being discovered at Montrose is a very fine and characteristic example of old Scottish work, the whole of the panels, styles, and rails being carved. Rowallan Castle, Ayrshire, in its late addition, examples of wall panelling, about 2·6 from floor, with frieze, base, panelling and dado, the fireplace being panelled up to the ceiling. The space between the dado and plaster cornice formerly had been hung with tapestry, the grounds of which are still sticking full of the nails which had fastened the covering to the walls. Near Ballinluig is an old house, rather rude, which goes by the name of Pitt Castle, in the best apartment of which is an example of wall panelling, with ground work of broad boards, on which is a series of arches or pilasters, frieze and cornice. Ethie House 8 miles from Arbroath, is a fine old baronial mansion house of the 16th century, and has examples of late wall panelling of the 17th century. The fireplace has the usual moulded stone and wood jambs, with 3 bevelled mirrors above of a small size. At this point I may bring in an example of a screen across a hall to be seen in the hall of Falkland Palace. It consists of heavy frame-work heavily moulded, the bottom part filled in with panelling, and above this 2 rows of turned pillars set pretty close together, with a 2 leaved door in centre, bottom part with panels, top part filled in with pillars. A good example of a drop handle is to be

seen on the door of wrought iron work. In the same hall is some wall panelling. The ceiling of hall is also panelled in wood, with pattern in squares formed with moulded ribs, the squares being filled with old decorative work in colour in good preservation. Date of this about 1550. At Holyrood Palace we have also an example of wooden ceilings divided into pattern with moulded ribs and coloured decoration. At Ferniehirst Castle, Roxburghshire, there still remains an example of wooden ornamental ceiling from the library, formed of moulded ribs gathered into the centre like a wheel, the circular part in centre being heavily moulded and enriched with carved members from which hang a carved circular drop. Drops also hang from the middle panels of ceiling, while the book shelves had been supported on carved and shaped brackets.

We have also many examples of doors dating from the 15th to the 18th centuries, which exhibit characteristics of their time in their several details. From our own town, from Earlshall, Anstruther, Muchalls, Melville Castle, Fife; Darnick Tower, Melrose; Kellie Castle, Fife; Amisfield House, Dumfries, and the Edinburgh Wynds and Closes; Rowallan Castle, Ayrshire; Culross, St Andrews, and other places. A few of these doors carried dates and initials in their panels, and it may be remarked here in passing, that this practice of carving initials was a favourite one in the 16th and 17th centuries, especially on the outside of their buildings, these initials being the initials of the proprietor and his wife.

After doors in the natural sequence of events, come windows, but as the windows of these old days were somewhat different from these of the present day, a slight description of them will be necessary. Every student of our old castles and other domestic buildings, must have noticed in going over them, that the window jamb had a check for the glass along lintel, and only came about half-way down the jambs. This with me in my early days of sketching, was always a mystery until I found out that the under half of the window was filled up with wooden framing, forming shutters or shutter boards as they are technically termed, the shutter boards forming the only way of getting air into the apartments, as the glass above was a fixture. Many examples remain to us yet of the shutter boards in position; the old examples with the leaded glass above, and the later examples with wooden sashes, divided into small square panes, but fixed, of course.

A characteristic example may be quoted, the shutter boards in two leaves, opening to the inside of room, exhibiting on the outside a nicely moulded door with carved panel in centre, the broad upright dividing them, being also carved, as well as the cope which divided the window into two in its height. In many places throughout the country examples of the copes can be seen, but uprights and boards away. Of this there can be seen a few nicely carved copes in the "Palace" Culross, at Falkland Palace, at Saughton House, near Edinburgh, and at Dalcross Castle, near Inverness. It is remarkable that not one of these examples of shutter boards and doors are alike in design, but that in each of them something new is to be seen. The whole of the preceding examples of old woodwork were, I have no hesitation in saying, of native workmanship and design, their character and details sufficiently testifying to their Scots origin. For example, compare any of our shutter boards with our old examples at Antwerp. Some of you will recollect them, in the Plantin Museum in Antwerp, they are unmistakeably foreign, and have not the least resemblance in detail to those brought under review, although they are both shutter boards and occupy a similar position in the window, and do the same duty.

The characteristics of these native examples will be found in the greater number of our examples of domestic woodwork in the form of cabinets, chairs, presses, tables, and such like, clearly proving their Scots origin as I have before remarked, I will take up a few cabinets, and will begin with one with a date, viz., Archbishop Sharpe's. This is a small cabinet, measuring about 3 ft. 3 in by about 6 ft. high, was obtained in St Andrews district by the late Joseph Paton, of Dunfermline, may years ago, was sold at his sale as Chapman's, and was exhibited for a number of years in the Industrial Museum, Edinburgh, by the late Sir Wm. Stirling-Maxwell, Bart. of Keir. The under part is open, on turned legs, with drawers under top, the top part forming two cupboards. The date in inlaid work in frieze is 1621, a few years earlier than the panelling from Study Culross, and the Pitsligo Lord's Loft, and a few years later than the carved wall panelling from Crail, but the details of all are somewhat similar. A cabinet, in oak, measuring about 4-6 wide by 7-6 high, of oak, with ebony panels and ornaments, said to have belonged to Linlithgow Palace, is an imposing piece of furniture and is composed 2 of

bottom drawers and 4 cupboards above, divided into 3 stages, and filled in with a carved lion's head. This is another good example of a Scots cabinet. The next cabinet to be noticed was picked up in Stirling, where it had long been known as "Queen Anne's Press," the Anne of Denmark, Queen of James VI. Altogether this cabinet is of a much more florid design than the last two, yet when examined in detail, it reveals many beautiful and interesting points. The size is about 5-6 wide by 7 in height and forms two parts, the upper containing 3 recessed cupboards, and the under 2 drawers and 2 cupboards. It is elaborately decorated with inlaid work in all its parts, generally box with the foliage and ornaments of ebony and various shades of browns and yellows, many of the inlaid parts being burnt at the edges and other parts to give variety and shade. The whole of the inlaid work forms a charming picture, with none of the hard coarse contrasts of colour seen in modern wood-inlayer's productions. This is a very good specimen of old Scottish cabinet-makers' work. The George Heriot of the cabinet-makers executed this no doubt to the order of his royal master before he went to Denmark to bring home his bride. The Industrial Museum is enriched with an old cabinet almost similar to the last both as to ferm and detail, and is entitled "Johnstone Collection, February 1869." Another example of Scottish cabinet work is got from Falkland Palace, also in the form of a cabinet in 3 stages, the under-part forming cupboards, the middle stage 1 deep frame and the top stage 2 shallow frames, the panels being enriched with inlay of mother of pearl and ivory on an ebony ground. The size of this is about 3-6 by 4-6 high. Other examples of cabinets are frequent, but the foregoing are characteristic examples.

Closely allied to cabinets are the presses of the 17th century, in fact it is sometimes a difficult matter to decide whether many of our old examples of this kind are presses or cabinets. An example of a press from Stirling Palace, picked up by the late Mr Joseph N. Paton, Dunfermline, exhibits a truly beautiful, homely, and honestly constructed piece of furniture. It is in 3 stages, the under 2 forming one cupboard each, and the upper portion forming 3 cupboards, the whole of the posts, rails, cornice, door panels, and other fixed panels being covered with characteristically Scottish carvings, the whole of which could, with benefit to the times, be literally copied in our modern furniture. From

Rowallan Castle, Ayrshire, our next example of press is drawn as it stands in the old hall of the castle, and is about 4 feet wide by about 7 feet high and consists of 2 doors, more like a wardrobe than a press, the door exhibiting some beautiful work of the 17th century period. In the Antiquarian Museum, Edinburgh, there is an example of a press from Pittenweem most elaborately carved, this also is in the wardrobe form, being flanked on each side with ¾ round columns, and carrying panelled frieze of about 15 deep and cornice, the 2 doors between consisting each of 3 panels and these are filled with round medallions carrying heads of royal and other noble personages, the rest of the panels being filled up with ornaments of the late 16th century above and below. While we are noticing the presses of our forefathers we must not omit their aumries, a universal feature of most of our old castles and mansion houses, with their holes in the walls generally off the large window openings. These were covered in with a kind of architecture and doors of wood. An interesting example of this we have in Rowallan Castle, Ayrshire, from the same room as the press is in, on the west side of the south-west window. The aumry is there enclosed with 2 doors, the panels carrying 2 pateræ each, the foils of which are pierced, probably for ventilation. From the east side of same window is a smaller example. From the Palace, Culross, we have 2 examples. From "The Study" in same town we have also a plain example. From Darnick Tower we have an example door enriched with carving and a date 1596. From the Antiquarian Museum we have a few examples of both plain and enriched with carving.

TABLES.

In Holyrood Palace we have a fine example of a late 16th century table, a dining table, and a telescope one to boot, but on a different principle from our modern screw extending table. Here we have a table evidently with 2 tops—5-3 by 3-0, but on examination we find the under top is in 2 parts, with a piece about 6 ins. in breadth fixed in centre, allowing the 2 parts to be pulled out for extension. These 2 parts have guiding rails fixed to them which run in two grooves cut in the end top rail of frame, which keep them in position while drawing and when out. When both parts are drawn out it forms a table 10 feet by 3-0, a simple and ingenious contrivance for an every day want of the present

day, as it seems to have been in those of long ago. This accounts for the cuts in the end rails of many of our old tables of this period, which have lost their under tops, and have had the upper top fixed to the frame. I was surprised 2 or 3 years ago when sailing up the Rhine in one of the steamers, to find this same idea still in vogue in the fatherland, in a modern passenger steamer. A table from Holyrood exhibits a common feature of the taste of this period, viz., an arcade running under centre from end to end. Another example taken from Holyrood exhibits some very rich carvings of a similar date to last one. While here we might also note a small folding table in Queen Mary's bedroom, called her work table, a peculiarly neat example, having turned and twisted legs and a small drawer in end; the top of this example is also framed and mitred at corners. Another folding table is here, but plainer and of commoner construction. Trinity College Church possesses a fine example of a table of contemporaneous date with the first one under review. It exhibits the same features, but is entirely different in detail. From Stirling we have another example of extending dining-table, exhibiting a carved top rail, still quite characteristic Scots, also the enlarged legs, in this case quite plain turned.

ARM CHAIRS.

The natural drop from tables is to chairs, and I think we have the largest examples of chairs left us of our old furniture, so that few examples will suffice to give us their characteristic features. They can be divided into arm chairs and single chairs. A good and characteristic example of the finest we have is the one from Holyrood, the property of the late Jas. Drummond, R.S.A., some of the details of the carving being exactly similar to the carving in the Stirling press. An almost similar example we have in the chair from Pitreavie Castle, Fife, the property of the late Mr Paton. Two other examples of arm chairs, the property of Mr Thos. Bonar, shew the same features of the broad seat, narrow at back, encircling arms, flat, straight back all carved, with deep circular headed and carved top rails. The examples from Peebles are of the same form with different details. An example from Stirling shews a rather plainer example than usual, but the detail is good. The one from Perth Museum is of same form, but a small balluster is introduced between

the seat rail and stretches under, giving it a good appearance. The date is here given on back panel, 1588, and the top rail is straight and returned round back parts. The Glamis example is also very plain. From Queen Mary's Room, Edinburgh Castle, we find a rather rude example, shewing the arm or top rail, the turning a series of rounds in imitation of spiral work. The two examples, one from Fife and the other from Ayrshire, shew a similar form, with varied details in the carving of panel in back and top railings. The one from Dundee shews a new departure, in the leather pad in the back simply stretched across and nailed. This is a little later in date than the others. We now come to one probably about same date as Dundee one, from Holyrood, which was the property of the late Dr Alex. J. Smith. It shows a large sized arm chair with the first ideas of the cabriole legs, the back of which is most elaborately carved with foliage, crowns, and cherubs' faces. From the Trades Hall, Aberdeen, is shewn an example of 1661 date, the peculiarity of which is in the arcade under seat. In this hall is the finest collection of old chairs to be seen. From the Smith Institute, Stirling, is shewn a later example of an arm chair.

SINGLE CHAIRS.

The chair from Loch Leven exhibits the characteristics of the late sixteenth century chairs, its turned legs and stretcher, wood seat with mouldings off edges of rails, high, slightly sloped back, in this case with plain, and flat and half-circle top rails with three flat uprights between. The one from Holyrood with the crown carved on top rail and on side uprights of back, also on flat and stretcher in front, is commonly called the five crowned chair. An example is given from Darnick Tower of one with plain square stretchers underneath and the open back filled in with four turned pillars, and arches, and carved top rails. Here will be found a rich collection of old Scots chairs, collected by Mr Heiton, architect, Perth, and also in his office in Perth. Various examples are shewn on the walls of chairs of later date, to the time when they were enriched with brass ornaments.

CHESTS.

Chest formed an important piece of furniture. One typical example will suffice, viz., the John Cowane chest, which, thanks to the persevering energy of ex-Dean of Guild Shearer, is still in our midst. It is formed of oak framed together and

filled in with panels in front, generally three within 8 or 9 inches of floor, with framed and panelled lid, generally wholly covered on posts and rails and panels with carving and inlaid work.

We now come to what I have called miscellaneous examples of furniture. The first is a bed in the Palace of Culross formed in the bossing of one of the windows, of what seemed to be part of the panelling, which fell down and then the bed was made. Certainly a rough and ready way of going to rest. The late Mr Paton of Dunfermline had a good example of an old Scottish bed, said to have been in Dunfermline Palace, and commonly called James the Sixth's. It consisted of a panelled front and end, corner posts nicely turned and carved with arcade at foot, low panelling at foot, back, and head, panelled right up to cornice, with cornice the whole size of bed, enriched with carving and inlaid work. A fine example of a cradle, said to be Queen Mary's, was in the possession of the late Mr Paton, Dunfermline, and was got from Linlithgow Palace. It shows the cradle to be formed of four posts sloping outwards, the feet fixed to carved rockers, with panelled sides and ends, carved cope moulding. An example from the Earl of Marand Kellie's collection shows the same form, but with more elaboration in the carving and the inlaid work. Examples are shown on the walls of an old desk, with carving almost identical to that on the Rowallan door above mentioned; of old wall shelves, mural mirrors, drawers, and other miscellaneous things.

CONCLUSION.

I have thus rapidly glanced at a quantity of old woodwork at present existing amongst us, and I have no hesitation in saying that it bears the impress of native conception, and execution, as was stated at the commencement of paper. I have not the least doubt there are many more examples of old woodwork still to be measured and drawn throughout the country, and it is for the members of this association to do their part as opportunity occurs to make our illustration of Scottish woodwork complete in the course of time. I have no doubt you have been struck with the whole of the old examples passed under review to-night. I do not think you will find one thing similar to another. This is one of the most refreshing and wonder-infusing feature of this old work, and one that could with advantage be reproduced in our modern furniture and woodwork, the idea with manufacturers of the present day being to make as many articles as

possible all of the same design and pattern. This commercial feature of the times is the complete destruction of all art feeling. The comparative tameness of most of our modern work in comparison with the vivacity of the old, I do not think is so much the loss of talent, as the neglect of study. We must have the blood of these old artificers running in some of our veins. I hail with the greatest satisfaction and interest the commencement made to give technical and practical work in our secondary schools, and am deeply in favour of the idea that the study of old woodwork should form part of their curriculum, more especially of those pupils who fix on the designing or working in wood as their business or profession.

The following paper was read by the Rev. J. E. H. Thomson, B.D., at the monthly meeting of the Stirling Natural History and Archæological Society, held on 5th April :—

THEORIES OF THE GLACIAL PERIOD.

There are few, among the many interesting subjects brought under our notice by geology, possessing more of a weird interest for us than what Professor Geikie has called "The Great Ice Age." A strange terrible picture of our native land rises before us; we find it covered from Maidenkirk to John o' Groats with a thick mantle of ice, and this ice is not stationary but moves with the slow resistless force of the glacier, now scooping out hollows like that now occupied by Loch Lomond, now scraping down the tops of our mountains, and now forming rolling hills like those near Denny. Had there been human eye to survey the scene, nothing but trackless snow would have met its gaze, save where black and barren, the rocks tore through the sounding sheet of snow—no life save near the sea where the huge walls of ice hung over the waves on which sea birds perched a little while to rest them. Perhaps there might be seen, here and there, a little patch of vegetation, but these patches would be rare and only on the mountain sides. Inland not a sound would be heard but the occasional thunder of an avalanche when its burden of snow became too heavy to be longer sustained. Even this would be deadened by falling on snow. We have spoken of a prospect of a wide expanse of whiteness, but the fogs, chill and heavy, would render prospects of any kind of rare occurrence. Such was Scotland according to the

best geological authorities during the glacial period, and it would be interesting even from a scenic point of view to discuss how this state of matters came about. But we have more than a spectacular interest in the glacial period. These glaciers or icebergs, whichever they were, have carved out our country for us. In all likelihood these glaciers ploughing their way down the course of the ancient Rhine tore this country from the continent. So all in our history that results from an insular position is due to these great glaciers. The interest of the problem is increased geologically when we put alongside of the glacial period the evidence we have of a tropical fauna and flora within the arctic circle in the miocene period that immediately preceded the glacial period. The object of the present paper is not to lay before the society any novel observations or novel theories, but simply to give an exposition of the various theories that have already been advanced to account for the great glacial period. We shall not venture to decide the matter. The number of the theories in question we may remark amount to something close upon a dozen. When the number of theories is so large it will obviously be advantageous to classify them and to apply the old maxim *divide et impera*. It is further obvious that we may divide these theories at first sight into those that assign a terrestrial cause for the change in the earth's temperature that brought on the glacial period, those which assign a non-terrestrial, or, as we may call it, an astronomical cause, and lastly those which combine those two. In the first class what we shall consider first is the theory of the Duke of Argyll, who ascribes all the phenomena known as belonging to glacial period, to the Noachian Deluge. The Duke opens his case by proving the universality of the tradition of a deluge. On the competent authority of Lenormant, he says, that the universality of tradition cannot be overlooked, every race, but the negro, has tradition of the deluge, but such a result would be attained if the deluge in question were universal simply in respect of the primary cradle of the human race. The Duke next proceeds to take up the geological evidence and justifies himself by his own observation of the damage wrought by the bursting of the Crinan Canal —further evidence of the tremendous effects of floods may be found in Sir Thomas Dick Lauder's "Morayshire Floods." The Duke remarks that one of the effects of a gigantic inundation is the segrega-

tion of gravel and mud. He shows that this has taken place on a large scale, masses of gravel being gathered together in such places as Wales, and of mud in the *loess* of the Rhine Valley. He shows also, further that the case of ground this segregation could not have taken place in incalculably remote ages from the fact that the chemical action of the carbonic acid in the gravel would have made the shells disappear. Again from the fact that in the *loess* the shells preserved are not lacustrine shells, but land shells, he argues that the inundation which deposited the mud was not from the bursting of a lake or from the swelling of the Rhine, but that a spent sea-flood might, by stripping the woods produce the results in question. Further, the Duke of Argyll takes notice of the facts that the remains of tropical and arctic animals are found in close proximity if not actually intermingled. Moreover, the gathering together of the remains of animals like the mammoth, the woolly rhinoceros, etc., on the northern shores of Siberia, where certainly in present circumstances they could not have lived even now, and still less in the glacial period. This, he thinks, might have resulted from the Noachian Deluge. I may here refer for a moment to a further development of this theory which I derive from the papers of a relative who died several years ago. He believed the glaciation of the northern hemisphere was due to the Noachian deluge, or rather to the catastrophe which caused it, which he imagined to be some vast volcanic outburst within the arctic circle, which sent the iceberg-laden waters of the Arctic Ocean over Europe, Asia and Northern America, and hence that all the mountain glaciers are really due to the stranded icebergs of that time. It may be thought confirmatory of this view that Nordenskiold found in the north of Siberia enormous masses which he regarded as the product of aerolites—but which since have been regarded as the product of some vast volcanic outburst—one thing may be noted, those masses which Nordenskiold discovered, were almost wholly *siderolite*. From the fact thas the specific gravity of the Earth as a whole is so much greater than any of the rocks of the surface, it has been argued that the heart of the earth is composed of some metal, probably of iron. Hence it would seem that if the mass were so wholly iron the eruption must have proceeded from a vastly greater depth than ordinary volcanic eruptions, and consequently might be supposed to be more violent and wider spread in its effects. What effect would

be produced by the Earth having to sustain on its northern pole such a battery of red hot shots as Nordenskiold suggests cannot well be imagined. To answer this theory by saying that the geologic evidence points to a greater antiquity than the period of the volcanic deluge is not sufficient, for that answer takes for granted that geologic chronology and Biblical chronology are both fixed, whereas the truth is that neither is so, as in geology, an effect which may be produced in a few days at one time may, in another state of surrounding circumstances, occupy centuries. As to the Biblical chronology, we all know how many links in every genealogy are left out at every point.

The next theory is that glacial periods are due to the cooling of the earth. Now it is obvious enough that since the earth was at one time a mass of vapour, then molten matter, then crusted over, it is a cooling body, but after the molten lava was fairly crusted over there would be a comparatively slow radiation, so that now the cooling of the earth has been practically *nil* for millions of years. Moreover, even grant that the cooling would produce the glaciers of the Northern Hemisphere, a new difficulty arises why the present temperate climate? If it were due to the impact of some huge celestial body with the earth, the warming up would be rather too great for the purposes of the present theory. Next comes a theory that has more evidence in its favour and has been more generally accepted. It is supposed that the glacial period in this country was due to a change in the position of the earth's axis of revolution, by which in twenty thousand years the pole of the earth will no longer point to the present pole star, but to one considerably in the east of St Vega. It is also clear that were the pole moved into one country, the temperature of the surrounding countries would at once be brought down to that of the Arctic circle. However, close examination proves that this variation does not amount to enough to do anything like what is required of it. But it is argued that in the later geological ages, some vast eruption, causing the formation of mountain ranges might change the balance of the earth, and so its axis of revolution. Certainly were the mountain chains high enough to balance the protuberance at the earth's equator this result would follow, but Sir George Airey, however, shows that the said protuberance may be regarded as a mountain range twenty-five thousand miles long, six miles broad, and thirteen

miles high. These figures will at once convince the most ardent supporter of the theory at present before us that no conceivable mountain's range would produce any but the most insignificant effect against such a steadying belt—such a balance wheel as the equatorial protuberance. A variation in this theory has been suggested that the earth's shell may revolve free of the fluid nucleus and so a bend in it might produce the effect in question, but it seems as Sir Charles Lyell says, almost inconceivable that such a change of revolution could take place on the crust without being communicated to the fluid nucleus within, in fact it could only be on the supposition that the earth's crust enclosed the nucleus much as the outer of those ivory Chinese balls encloses those within it and in that case it would be difficult to understand the bending over the nucleus. If, as seems probable, the centre of the earth is composed not of fluid materials but of matter which, though not fluid, is, if not solid at all events of a pasty consisteney, it is obvious that any such change in the axis of the revolution of the crust would result in tremendous friction and finally to one body conforming its axis to that of the other. Moreover, the equitorial protuberance would, on the supposition of the centre of the earth being solid or pasty, render any change adequate for the phenomena impossible. Another theory is that the glacial period was due to the variation of the angle of the ecliptic. It is quite true that the angle at which the equator cuts the ecliptic is not constant in consequence of the fact that the mass of the earth is not ranged absolutely symmetrically about its axis. We may see the same phenomenon practically in a spinning top, the top sometimes inclines a little one way, then a little another; while the axis of the top's revolution is constant in respect of its own parts it varies in relation to the floor, so the axis of the earth's revolution varies relatively to the ecliptic. It is also true that were the earth's equator coinciding with the ecliptic, there would be no summer or winter, but a perpetual spring in temperate latitudes and perpetual winter in the arctic and antararctic circles, whereas if the angle were so greatly increased that the earth's equator were nearly at right angles to the ecliptic, the seasons would be exaggerated. The limits of this nutation, as it is called, are so small that the effect produced would be correspondingly small, hence it is argued that this alone is inadequate to account for the glacial period. Yet one more theory of those which place

the occasion of the glacial period in the earth, remains to be considered, and that is associated with the honoured name of the late Sir Charles Lyell. He declares that the glacial period was due to a change in the relation of land and water. To understand this we must bear in mind the effects of the Gulf Stream on the climate of the North-West of Europe. We all know of that marvellous stream which heated in the shallow Caribbean Sea flows northward impelled partly by the wind, partly by the simple action of gravitation. We all know how partly by its direct effect in heating the seas around the temperate lands in the north west of Europe, and partly, perhaps more, by heating the breezes that blow across these lands it makes their climate much warmer than it would otherwise be, as one may easily see by comparing this country with Labrador. If then any change were taking place so as to give the Stream a different direction, for instance, the sudden eruption of a mass of land to the south of Florida might send the stream more sharply west than at present, so that the North of Africa would get a double benefit of heat, or if the Isthmus of Darien were blown to pieces like the island in the strait near Java, then the stream might mingle with the currents of the Pacific, and leave us in the climate of Labrador. One marvels that the American Fenians have never thought of that as a way of employing their dynamite that would be most destructive. Passing from this, let us look at the distribution of land and water supposed by Sir Charles Lyell to be capable of producing the phenomena of the glacial period. In the first volume of his Principles of Geology, Sir Charles Lyell gives two diagrams exhibiting the aspects of the globe in the hot and the cold periods respectively. In the hot period we see all the land gathered round the equator in an irregular belt, in the cold period again all the land is gathered round the poles. Now, it is obvious enough that if all the land were at the Equator, the land in question would be hot; but that would not explain tropical vegetation found in Greenland and even nearer the North Pole, for by Lyell's diagram there i no land there at all to be either tropical or arctic. If, however, there were islands in these northern seas like what is indicated by the map he elsewhere gives of the distribution of land and water in the Eocene period—not that he put the glacial period so early, but simply he shows a predominance of water—then these islands instead of enjoying the

temperate climate that Sir Charles imagines would result from the gathering of earth about the equator, would be suffering the extreme of cold ; for all the heat that the rays of the sun imparted to the earth would be reflected back and dissipated into space ; there could, in short, be nothing of the nature of the present Gulf Stream. Certainly the lands within the arctic and antarctic circles would be cold on the other hypothesis, but were there any channels permeating these polar continents these would convey the water heated by the sun's rays at the equator, so that really the climate would be milder in the northern hemisphere during what Sir Charles imagines would be the glacial period than in what he imagines would be the cold. But further and most important there is no evidence of any such overwhelming change in the distribution of land and water. The theory seems more and more gaining ground that in main outlines the continents of to-day were the continents of the past. The theory ably advocated by Professor Geikie that the present continents with their backbones of mountains have been pressed up by the shrinkage of the shell of the earth upon the contracted nucleus, would seem to necessitate that in the main the continents were the same as now. If, as Proctor holds, the sea is gradually sinking into the earth, that the earth is, in short, a gigantic slowly acting sponge, then the area covered by sea now will in all likelihood be much less than that occupied in earlier times for two reasons ;—first, because according to Geikie's theory the seas are deeper now, and therefore have less surface for the mass of water ; and, second, because on Proctor's hypothesis the earth has absorbed so much of water that there is less of it to form sea. But yet while, as Sir Charles states his hypothesis, it seems untenable, yet it is obvious enough that some changes—not necessarily those suggested by Sir Charles—would produce something like the glacial period. If it be urged that it is too wide spread to be thus explained, it may be answered that the precise synchronism of geologic phenomena in relatively minute areas is not yet fixed, and perhaps not fixable. In passing one may note if Sir Charles's hot period, which is really a cold one, had ever occurred, the scratching, etc., which we attribute to glaciers, would have to be attributed to icebergs. This, however, cannot well be, as shown by Dr Croll, because the very fact that an iceberg is borne up by the water lessens its grinding power by precisely

the amount that its gravity is lessened by the water. With this, then, we dismiss the theories that would find the occasion of the glacial period in some change in the earth itself, not that we would be understood as coming to a conclusion adverse to them, but simply that we must for the present leave them, and proceed now to consider the astronomical theories.

These astronomical causes for the glacial period may be either catastrophic in their character or cyclic. To take the catastrophic first. I may mention, in passing, a theory I once heard advocated with considerable ingenuity by an old friend, a retired missionary. Feeling the difficulty involved in the recognition of the tropical period that preceded the glacial he thought the difficulty in question could only be adequately met by supposing the earth originally to have revolved as planet round either a larger sun or rather round a double sun and thus derived more heat than it can at present get. This accounted for the tropical miocene period; immediately thereafter a catastrophe occurred by which the force of gravity was nullified say by the two suns falling in upon each other and exploding into fragments; the earth then released would career through space and would gradually part with her heat until at length she came within the sweep of the influence of the sun. There are two difficulties in the way of this theory, first—it is difficult to imagine this catastrophe occurring—certainly the eruptive force in the sun is immense, but it is difficult to conceive disruptive force acting with such force on a mass of vapour as to produce such a violent effect. Disruption always implies the restraining of an expansive force, as in the explosion of gunpowder. It must be confined to explode; ignite it on an open plate and there is no explosion. There might be gradual but rapid expansion under the heat evolved by the impact of these two suns until the central body would fill with its mass the whole system, but the centre of gravity would still be the same so that the result of such a catastrophe would be no such wandering of the planets into space, but the evolution of an incandescent vapour, that with its fiery heat would not merely burn up every living structure on the earth, but even vitrify the surface itself. Second, this voyage through space would occupy a hundred years at a minimum, and during that time the ocean would be frozen solid and it would be doubtful whether even at the equator the heat would be sufficient after

almost any number of millennia to melt it. One theory may be suggested deduced from Proctor's theory of the cold at certain seasons being due to the earth being in meteoric shadow, and from Professor Tait's theory that comets are composed of aerolites. It is regarded by astronomers as proved that between the earth and Venus there revolve round the sun several belts of aerolites and that these cut the plane of the ecliptic at various angles. Proctor shows that even though these aerolites should be so sparse as not to observably darken the sun or even sensibly diminish its light it would yet obstruct so much of the heat that their presence would thus be made very noticeable. He instances certain periods when cold days are expected as the borrowing days, the Lammas floods, etc. Further, it is regarded proved that many of the comets that visit our system originally belonged to other systems. Sir Wm. Thomson at one time propounded a theory that the heat of the sun was to some extent kept up by the perpetual falling into it of aerolitic masses. The result of the latter theory would be the ultimate exhaustion of the aerolites between the earth and the sun ; grant that this to a great extent has taken place then the aerolitic veil removed the full heat of the sun would fall on the earth and might induce a tropical temperature even at the poles. Suppose now a huge comet not necessarily huger than some we have heard of in historic times to sweep between the earth and the sun, and to be imprisoned there by the force of the sun's gravity, then we should have a glacial climate extending much further south than now, down perhaps to the south of Spain and Italy. The gradual absorption of these cometic aerolites into the body of the sun would thin the veil again, and so at length the more genial climate we now enjoy would result. To explain the interglacial periods, we have only to imagine the belt of cometic matter not to completely surround the sun, to leave perhaps the half of its orbit clear, or nearly so, of aerolites. If then the time of this comet nearly synchronised with that of the earth, or if while approximating somewhat to the time of the earth's annual revolution, its orbit was at an angle to the plane of the ecliptic, then for long periods, say centuries, the earth would be in densest meteoric shadow, then for other long periods the veil would be withdrawn. Of course from the nature of the case there can be no direct evidence for this hypothesis. Yet Saturn's rings may be

looked upon as presenting an analogous state of matters in regard to one of the greater planets to that suggested by this hypothesis in regard to the sun. It may also be remarked that there are symptoms of the rings falling in upon Saturn. The last catastrophic astronomical theory that we would consider is that the glacial and tropical periods are due to variations in the heat of space. To think of space—mere empty space—having any quality at all but that relating to dimension seems self-contradictory. If, however, by space here is meant that mysterious elastic solid that fills space, whose thrills transport to us light and heat, nay whose thrills and vibrations all things are, then it is nearly as difficult to comprehend what it means. This strange material is all but infinitely elastic; it therefore transmits with all but absolute entirety all vibrations of heat and light; therefore it can absorb none, or almost none, hence the difference between its hot spaces and its cold must be infinitesimal. The primary assumption of the cyclic theories is that there have been an infinite number of glacial perio s, and that which we call the glacial *par excellence* is simply the most recent, and therefore best known. Of necessity the evidence for previous glacial periods is scanty and of doubtful force. It is almost entirely restricted to the presence of errant blocks of more ancient rocks in more recent strata. Dr Croll, the great advocate of the most prominent cyclic theory, assigns reasons for the disappearance of the remains of the successive glacial periods which may be here rapidly enumerated—1, Since almost all our geologic strata represent marine deposits, by the nature of the case few traces of glaciation will be retained, because icebergs do not striate the surface of the rocks, and because when land becomes the bed of the ocean all glacial traces are obliterated; 2, because of necessity organic remains of a glacial period are few and inconspicuous as compared with those of a tropical one. The first of these cyclic theories we would advert to is that which ascribes the cause of the glacial period to variation in the heat given out by the sun, that in short, the sun is a variable star. Of this little can be said, there are variable stars that is certain, but the nature cause or effect of that variation is unknown. Even admitting that the variations were caused by something occurring within the sun itself and therefore analogous to the spots that appear periodically in the sun, and that the diminution of light was accompanied

by a diminution of heat—and this, it may be noted, has not been observed in regard to the sun's spots—still this would not explain the interglacial periods. We now come to Dr Croll's theory, by far the most important of these that assume a recurrence of these glacial periods. It has this advantage over all other theories, that it founds itself in causes actually at work at present and calculable by astronomical methods. It has a certain seduction in it, for grant it to be true, and at once we can to a certain extent translate geologic into what may be called astronomic time, we can in short speak with something more like definiteness of the number of years involved in certain geologic changes. To understand this theory there are certain astronomical phenomena that must be borne in mind. The first and most fundamental of all is that the orbit of the earth is an ellipse, one of the foci of which is occupied by the sun. The next point is that during summer in the Northern Hemisphere we are furthest from the sun and nearest it in winter, hence the winters are short and mild and the summer long and temperate. Our summers are longer than our winters, Dr Croll assures us—though some of us are almost beginning to doubt it—by about eight days. A rather more recondite point or two must also be borne in mind. That the difference between the major and minor axis of this ellipse varies under the influence of the planets, so that the difference between winter and summer may amount to thirty-six days, and the sun be 14 million miles nearer at the one solstice than the other. Further, the precession of the equinoxes and the movement of aphelion in intervals of some 10,500 years the poles change places relatively to the sun—that is to say the hemisphere that has its summer in aphelion now will have its summer in perihelion, some eleven thousand years hence. At first sight this would not seem to involve so much change, for the earth would receive precisely the same amount of heat in the one position as in the other, and each hemisphere also would receive, and does receive, precisely the same amount of heat. But another piece of elementary physics must be borne in mind. The latent heat of ice is 142 deg. F., there is therefore required as much heat as would raise a pound of water 142 deg. F. (Wallace says 176 deg. F.), to melt a pound of ice. As Dr Croll puts it, this great amount of heat "is completely lost so far as temperature is concerned—is consumed not in raising the temperature of the ice, but in the mechanical works of

dearing its molecules separate against the force of cohesion binding them together in a solid form." Further, no matter what the heat of the sun's rays, the presence of snow and ice tends by radiation to lower the temperature of surrounding bodies to 32 deg. F. Further, the tendency of this chill earth and frozen sea is to congeal the watery vapour of the air into mist, and that again interrupts yet justly the sun's heat. To show the effect of the first two causes from the Arctic regions we may mention that at 80 N. latitude, "Captain Scoresby had the pitch melted by the heat of the sun at one side of his ship, while the water was freezing on the other side owing to the coldness of the air." If we compare again the south with the north, Sandwich Island is in the corresponding parallel to that of the north of Scotland, and it is covered with ice and snow throughout the whole summer, "this rigorous condition of the climate results from the rays of the sun being intercepted by the dense fogs which envelope these regions during the entire summer." This is only one side of the effect produced by the increased eccentricity of the earth's orbit when the summer of the Northern Hemisphere is in perihelion. Dr Croll is under the impression that the main cause of the gulf stream is the Trade winds. Now, if there is a great difference of temperature between our hemisphere and the other the Trade winds from the colder hemisphere will be much more powerful than those from the warmer, and that consequently the warm water of the tropics will be impelled by the wind into the hemisphere which is already the warmer, on the other hand the hemisphere already the colder would become yet colder, because the heating currents are not cut off but the cold water from below is forced north by gravity to supply the place of the surface water forced into the tropics. Thus, in the circumstance supposed, everything would tend on the one hand to glaciate the Northern Hemisphere, and on the other to make the south mild and equable. Again, the nearness of the sun in perigee would produce vapours that, swept along in the upper frozen currents with a like force and rapidity to that manifested by the lower air currents, would of necessity be deposited at the north Polar regions in form of snow all the more copious from the amount of vapour taken up by the hot tropical sun. And we have already seen the cooling effect of snow. All these causes would naturally tend to increase each

other in turn. The cooling effect of the snow would tend to increase the difference between the two hemispheres, and that would increase the rapidity of the Trades in the colder hemisphere, and hence more snow would be brought where already there was more than its share. As the poles change places in intervals of ten thousand five hundred years into this glaciation will be transferred from one pole to the other, and the period between will be mild and equable. This, Dr Croll regards as explaining the inter-glacial periods. Such, then, is Dr Croll's theory, it is certainly ingenious to the last degree, and at first sight, at all events, meets the various phenomena wonderfully well. It would imply that at intervals of some million years or so these glacial periods would recur. Now the evidence of this is singularly scanty as we have already remarked, consisting mainly of errant blocks of older formation embedded in the more recent. Another point that seems to me not to have been noticed is the effect of the earth being at perihelion and aphelion in the equinoxes. This of necessity would occur during the interval between transference. At summer and winter the earth would be at the opposite ends of the smaller diameter of the ellipse, consequently the one hemisphere in the spring, the other in the autumn would enjoy the heat due to the proximity of the sun, modified by the fact that the day was twelve hours long instead of fifteen or sixteen. In either case, whether perihelion was in spring or autumn, this would act as a prolongation of the summer, whereas the lengthened day in aphelion would modify the severity of winter. This would seem to indicate that the mild periods were much longer than the cold ones, and hence that a mild climate, not a glacial,' would be the characteristic of the period as a whole, save at recurring intervals of say three thousand years. Again, the inter-glacial periods indicate more than merely a mild equable temperature. Such then are the main astronomical theories of the causes of the glacial period. One more theory falls to be considered, and it stands associated with the much respected name of Alfred Russell Wallace. It is published in his work entitled "Island Life." While adopting to a great extent the views of Dr Croll, he has supplemented them to some extent from the views of Sir Charles Lyell, which he thinks have not got due consideration given them by Dr Croll or his follower Professor Geikie. On the supposi-

tion that according to Sir Charles Lyell there was no land at the poles at all, then no snow would be deposited; hence, so far as that goes, one of the great cooling agents would be absent. Hence if this occurred in the period of great eccentricity, then the effect of that eccentricity would be modified. Again if all the land were gathered at the poles this chilling process would go on unchecked. He further shows that conformation of land has a great deal to do with the fall of snow. Snow never lies long in a plain, it is always in hilly districts. Further, the course of the Gulf Stream might be altered, as we have already said, by some slight changes in the arrangement of land and water, and thus would either intensify or moderate the severity of a glacial period. Yet, on Dr Croll's hypothesis, the Gulf Stream is caused in the main by the winds, consequently land conformations can have little to do with the matter. However, Mr Wallace suggests that if these islands were once united with the continent, then, as a barrier, they would throw back the Gulf Stream and prevent it warming the shores of Scandinavia that would get covered with snow, and that the cold thus produced would react on our own country and cover the Grampians with perpetual snow, like the mountains of the same height at even a lower latitude in South America. Again, Mr Wallace suggests that if through geologic change Greenland were united with Baffin's Land, then the cold Arctic current would be stopped and the climate of America would be much ameliorated. These changes, and others he refers to, have occurred again and again in the tertiary epoch. One change, it is certain, has occurred in regard to America, it is more depressed in its north-eastern portion now, than during the glacial period. During its superior elevation the Newfoundland banks would be far above high water level, and "stretch out in an immense curve to a point more than six hundred miles east of Halifax, this would divert the Gulf Stream to the coast of Spain," consequently the icebergs from the Arctic current being retarded, would form ice packs and chill the atmosphere. "When such was the state of the Atlantic during the glacial period, can we suppose that the mere change of the distant sun in winter and the near sun in summer, to the reverse, could bring about any important alteration, the physical and geographical causes of glaciation remaining unchanged." "It seems to me, therefore,"

says Mr Wallace, "that wherever extreme glaciation has been brought about by the combination of astronomical and geographical causes," that the ice sheets will not be moved during the alternate phases of precession." This would account for the comparative infrequency of remains indicating interglacial periods. I have now brought before the society most of the theories which I have found brought forward to account for the glacial period. Certainly the present paper has not produced anything original either in the way of observation or of theory, it has simply endeavoured to be informative so that should evidence in favour of one or other of the theories fall under the notice of any member of the association, he will be in a better position to estimate its value.

-On Tuesday, 3d May, the usual monthly meeting of this association was held in the Smith Institute, the Rev. W. F. Goldie, presiding. There was a fair attendance of members. The minutes of the last meeting were read by the secretary, Mr Sinclair, and unanimously approved. An archæological paper of great local interest, illustrated by diagrams, was read by Dr Drew on "The Heading Stone of Stirling and some of its Associations." A lively discussion followed opened by Dr Galbraith, who said that tradition in his school day pointed to the Hurly Hawky or Mote Hill as the site of the execution of Duke Murdoch, and a small stone projecting from the ground on which they as boys, imagining the scene, placed their heads, saying, "This was where Duke Murdoch was beheaded," as the true heading stone. But the question he wished to ask was if there were any other instances of heading stones occurring in Scotland? He had never heard of any, and asked for information, and not to throw discredit on this stone. Miss Maclagan said that the present position of the heading stone was not its original one. Throughout all Scotland when justice was administered within the round castles or towers, the place of execution was always within the place where judgment was given. On Hurly Hawky, the site of probably the oldest fortification or castle in the district was found. She had examined the mound along with her gardener, and found the remains of red sandstone walls, showing that some such structure had been there.

Dr Drew stated that his paper said nothing with regard to the true position of the stone, but only considered its genuineness as a historic relic.

Mr SHEARER in answer to Dr Galbraith said that at Killin, in the Castle of the Breadalbane family, where the chief had the right of pit and gallows, there was still pointed out a stone where the unfortunate victims placed their heads for execution. He also read an extract from Randall's History of Stirling (edition 1817), supporting Miss Maclagan's contention that the Heading Hill was Hurly Hawky where sentence was also passed. He concluded by suggesting that the stone should be brought to the Smith Institute, and a brass plate affixed to it, and there preserved. Dr Drew stated that a suggestion had been made to have the stone surrounded by an iron rail and a seat placed outside. Mr John Allan, architect, suggested that as another way of celebrating the jubilee, the society should take steps

to approach the powers that be with a view to having the stone preserved in the way mentioned by Dr Drew. Mr Shearer supported Mr Allan, and after a little discussion it was moved by Mr G. Macdougall, and unanimously carried that the matter be remitted to the council of the association to take what steps they considered best in the matter and to report to next meeting, Mr Allan to be associated with the Council. With regard to the reliability of tradition, Mr Jamieson said that recently he read an article by Prof. Geikie, where he stated that on the Lammermoors he was told by a lady that a thorn bush had been said to mark the burying place of two of Cromwell's soldiers shot here after the battle of Dunbar, and on search being made buttons with the date of Charles I. had been found. Dr Galbraith asked if thorn bushes were so old as to mark historic events in this way, and Mr Sword said that there were instances of thorn trees attaining great age, and he had one in particular in his mind which was quite old enough to mark any of the historic events which had been mentioned. This closed the discussion. Mr Goldie intimated that a paper by Mr G. Macdougall on the "Potato" was postponed to next meeting,

THE HEADING STONE OF STIRLING; AND SOME OF ITS ASSOCIATIONS.

INTRODUCTION.

It appears that the subject of the following remarks has engaged the attention of individuals, interested in objects of local antiquity, from time to time. About nine years ago it received some notice in the public press; and on several occasions before that it gave rise to a good deal of discussion in the town; and I hope the revival of the subject to-night will have the effect of showing that interest in the relic of human blood still survives, and as a result something will be done for its preservation. Objects of antiquity in which dwell historic associations of the past, relating to persons and events occupying a prominent place in Scottish history, demand our regard; and when duty fails in this respect, a corresponding loss ensues with regard to efficient educational training, while the antiquarian sustains a shock to his emotional nature.

My attention was drawn to the Heading Stone some years ago; and on making a visit to it, in the company of a Son of the Rock to whom it had been known from boyhood, there arose in the mind a succession of images as my friend related the tragic

events which took place upon it. Observing that it bore evidences of neglect, we pointed out its condition through the medium of the local papers; and stated that at very little expense this could be obviated. Our communication was supported by the late Sir James Alexander of Westerton. He contributed a long article under the title of "Stirling Antiquities," in which the subject is referred to at length. Sir James expressed his views in poetical language; and as an introduction, says, "Besides its beautiful and commanding situation, overlooking the fertile valley of the winding Forth, with the noble Grampian range in the distance, the massive Ochils and Abbey Craig with its Wallace Tower, recalling the recollection of heroic deeds, Stirling owes much of its attractions to visitors in its old buildings and objects of historical interest. Among these last is the Heading Stone." Owing to the matter thus being brought before the public, the people flocked to the spot in numbers in order to gratify their curiosity with an inspection of the relic, but beyond this nothing has, as yet, been done.

SITUATION.

It at present lies on the third hillock of the Gowling or Lamentation Hills in a direction north-east of the Castle. This locality possesses interest from another point of view; for near to the spot there is a Roman inscription on the rock, stating that the eleventh legion kept watch and were stationed at this place. The eminence commands a complete view of the surrounding country, including Kildean Ford, and on this account would be fixed upon by the Romans as a point of observation. On this historical ground the Heading Stone will be found lying, and I am informed that it was placed there at the instance of the late Dr William Hutton Forrest. This medical gentleman took a deep interest in the antiquities of Stirling, and did much of a practical nature to bring them to light. In his day our relic was lying at the foot of the hill, but as tradition pointed to the top as having been the seat of the executions, and consequently the historic position of the stone, he determined and effected its removal to this place.

APPEARANCE.

To the eye it presents the outline of a square, but is somewhat roundish.

DIMENSIONS.

It is roughly 31 inches by 31 inches, and stands 10 inches from the ground at one end, gradually

sloping up to 15 inches at the other. The exposed surface has been highly polished from the continuous action of natural forces, but I regret to observe that the polish is now being rapidly effaced by the idle work of man in handing down to posterity unknown names. There are other marks which deserve attention. Three holes are plainly visible, and may have been chiselled out to receive batted pegs on which would be fixed a wooden block, or to secure straps for the purpose of holding down the victim. At one corner a good deal of chipping, evidently of recent date, has been done ; but on the side looking to the north there is a natural indentation, taking the form of a segment of a circle 18 inches by 2 inches, and which, owing to its peculiar formation, has furnished a key to an observer, showing the position of the victim with reference to the stone. It has been suggested that upon this hollow, on being made to kneel, the victim rested his breast while reclining his head on the block, and certainly decapitation would be possible in this way, but it could also be equally as well accomplished with the body lying across the stone and the head projecting beyond, the use of a wooden block in this case being dispensed with. At both levels the neck would receive the fatal blow from the axe of the executioner, equally telling to the life of the unfortunate one. But having lately examined (30th April, 1887), the surface at present next the ground, I am in a position to say that it bears evidence of having been the real side on which the executions took place (but no doubt as I have already stated, either side may have been used). On this part there are three holes, the largest being $1\frac{3}{4}$ inches deep, and the other two somewhat less, which can be traced to have had a connection with each other by means of a chain and collar for the neck. The workings of the chain are quite distinct, especially on the outer hole at the edge of the stone. Near to its centre there are marks running diagonally as of an axe, and curved axe, and one mark in particular, which measures 12 inches across, could only result from a succession of blows. Along one side there are also a great number of tool marks. Before leaving the subject of marks I ought to say that an explanation of how some of them were made dates from a time long subsequent to the executions. In the early part of the present century the Heading Stone had been rolled down the hill as far as the Old Bridge ; and, probably before this it had been dislodged from its original position out of a feeling of

disgust due to the recollection of the horrors that had been enacted upon it. It then lay near to the place of business of a butcher named Tam Dawson, who did a large trade in sheeps' heads, and Thomas is reported to have used it as a block for chopping sheeps' horns, and the marks of his hammer are also said to be plainly visible on the stone.

GEOLOGICAL FORMATION.

I have just a word to say on this point. It has been described as a piece of a Highland schistose rock or travelled boulder, and accepting this statement as correct, it would be transported to our locality at the Glacial epoch.

EVIDENCE OF TRADITION.

When we come to enquire as to the ground of our belief with respect to the historic character of the Heading Stone, we find that the available evidence reaches us through tradition. There is, so far as I am aware, no written proof extant bearing on the subject. All the official details of the executions, so far as the stone is concerned at least, have been destroyed. Still we are indebted to the ballad literature of the times for an account of the executions, in which mention is made of the stone. In pathetic verse it is recorded how young Walter and his relatives were led to the "Heading Stane." Now, in the absence of historical documents, when a question of this kind is under consideration, what local tradition has to say in the matter becomes important, for by this means the facts of remote events hsve often been handed down to succeeding generations, and instances I know are familiar to you all. But an example also furnished by this locality, and of recent verification, may be related. For a long time a thorn bush could be seen growing at a certain spot amongst the ruins of Cambuskenneth Abbey. It is said the little children of the place were wont to assemble at play around the humble bush; and when asked why this spot was so often selected for their gambols, they replied, "Because we can dance upon a king's grave;" and, with respect to the same tradition, a Son of the Rock informs me that in his early years he was often taken by his father to the Abbey, who drew his attention to the bush, and said it had been planted there to mark the grave of James III. Many of you remember of search being made at this particular spot which resulted in the discovery of the king's remains lying under the thorn bush; and we all know a handsome memorial has been erected by com-

mand of [Queen Victoria, as a restoration of the tomb of her ancestor, James III., King of Scots. Here, then, is presented a tradition which, on investigation, turned out to be true; and, although, in the case of the Heading Stone, it may be impossible to prove its genuineness by bringing official written evidence to bear on the question, yet, we may also be allowed to retain our belief in it as a historic relic, founded, as it is, on an examination of the stone itself, and seeing that our opinion is strongly supported by local tradition. Many of the older citizens of Stirling, were, in their youth, familiar with the Heading Stone and its associations; and, in some instances the story of tradition can be traced several generations back, descending intact from father to son; and it would also appear that at the latter part of last century the belief was undisputed. And further, when in addition to the tradition, coupled with the register of events found upon the stone itself, the period of the executions, and the term Gowling or "Hills of Weeping," are taken into consideration, it appears to me that a solid proof is made out to establish our position. The age was rude and the kingdom was in a state of turmoil. On the sentence of death being pronounced no time was lost in carrying it out. The prisoner, as a rule, had not long to wait in confinement—he was instantly beheaded. Accordingly, when those entrusted with the bloody work were commanded to act instantly, just such an object as the stone lying on the hill would meet their barbarous requirements; for besides being naturally adapted for the purpose, it was always ready for use. We now come to

SOME OF ITS ASSOCIATIONS.

We learn from the pages of history that the Heading Stone in all probability was drenched with blood in the time of James I. Certainly, executions were carried out at that period upon the Heading Hill or Gowling Hill. The name Gowling means weeping or mourning, and originated, as applied to the hill, in consequence of the executions. On the King's return from captivity in England he found the country in a bad condition. He had acquired every accomplishment during the term of his imprisonment, and was naturally a man of great force of character and secretiveness. He determined to compel his rude and turbulent barons to renounce their ideas of individual independence, and to become quiet and peaceable subjects. With this object in view he exclaimed with great vehemence—"Let

God but grant me life, and throughout my dominions I shall make the key keep the castle, and the bush secure the cow, though I myself should lead the life of a dog to accomplish it." But the carrying out of this resolution cost the King his life. As the disorders of the Kingdom were found to be too deeply rooted to be eradicated by mere legislation, treason and rebellion were declared to be punishable with forfeiture of life, lands, and goods. The first on whom this punishment was awarded belonged to the house of Albany; and the royal vengeance fell upon Murdoch, the second Duke, with his two sons Walter and Alexander, and his father-in-law the aged Earl of Lennox. The real offender against the Royal family was Robert, the first Duke of Albany, who was alleged to be the murderer of the King's brother, and the main cause of his own protracted captivity; but he had passed away beyond the reach of human punishment. On the 24th of May, 1425, Walter Stewart, the eldest son of Murdoch, was brought to trial in a court held in the palace of Stirling, and presided over by King James himself. Walter was found guilty on a charge of robbery, condemned to death, and instantly beheaded. On the following morning Duke Murdoch, himself, his second son, Alexander, and his father-in-law, the Earl of Lennox, were tried before the same jury. The nature of the charges brought against them is unknown, but they were all found guilty, and executed on the Heading Hill, before Stirling Castle, within sight of the stately palace of Doune which Albany had erected for his residence; their immense estates were at the same time confiscated to the Crown. The lofty stature and commanding presence of Duke Murdoch and his sons, and the venerable appearance of the Earl of Lennox, who had reached his 80th year, together with the respect naturally paid to fallen greatness, excited a a deep feeling of compassion in the breasts of the people; and even among those who admitted the justice of the sentence, the recollection of the faults of the sufferers was lost in sympathy for their misfortunes. The punishment was generally regarded as excessive, and excited a vindictive spirit of revenge in the bosoms of many of the nobility, and ultimately brought the King himself to an untimely grave. The country had now assumed a state of comparative prosperity, and when all seemed secure a dark conspiracy was formed among the nobles of his court. This plot against the King owed its origin to indignation at the fate of Albany and his

family, and to those deep feelings of feudal revenge which had been long cherished by the friends of that unhappy house, Sir Robert Graham, who was the principal agent in the execution of the bloody enterprise, was a man of the darkest and most determined character. He had both personal and family injuries to avenge upon the Monarch. Originally one of the supporters of the house of Albany, he had been along with the principal adherents of that powerful family committed to prison on the return of James from his captivity. Two years after this event, his nephew Patrick Graham, in accordance with feudal law regarding female succession to dignity, had assumed in the right of his wife, the title of Earl of Strathearn. But James would not allow this interpretation of the law, and resumed the possession of the powerful earldom, under the pretext that it was limited to heirs male. Sir Robert Graham remonstrated, although without effect, against this invasion of his nephew's rights. Accordingly, he determined upon revenge. In 1433, Sir Robert approached the Royal seat, and laying his hands upon the King, he exclaimed with great force, "I arrest you in the name of the three estates of your realm here assembled in Parliament; for, as your people have sworn to obey you, so are you bound by your oath to keep your people, and to govern by the law, so that you do them no wrong, but in all right maintain and defend them." Receiving on this occasion none of the promised support from the assembled barons and prelates, by command of the King he was instantly arrested, and shortly after had his estates confiscated, and was banished from the Court. Enraged at the failure of his plans, Graham meditated revenge, and said in a letter to the king, that if ever he could find the opportunity he would slay him with his own hand as his mortal enemy. He was true to his word on the king's life; and in accordance with a plot made the attack while James was residing at the town of Perth, in the Monastery of the Dominicans or Black Friars. Sir Robert Graham was chief amongst the traitors, and after a desperate defence on the part of the king, ran him through the body with his sword, and his associates, Sir John Hall, with his brother Thomas and others, finally slew him by repeated wounds of their daggers. The murderers were soon taken, and after being tortured were beheaded. On the arch-conspirator, Graham, being captured, he was conveyed to Stirling, shockingly tortured, and on the following day was beheaded on the Gowling Hill.

Sir Water Scott in the "Lady of the Lake," alludes to this remarkable locality and its associations in these terms—

> "And thou, O sad and fatal mound
> That oft hast heard the death axe sound,
> As on the noblest of the land
> Fell the stern headsman's bloody hand."

The usual monthly meeting of this society was held in the Smith Institute on Tuesday, 7th June—Dr Galbraith presiding. The minutes of former meeting were read by Mr Sinclair, secretary, and approved of by the meeting, after which the Chairman said that with regard to the preservation of the Heading Stone, the Committee appointed at last meeting had duly inspected the relic, and that three propositions were now before the Council (1) That the stone should remain where it now is; (2) That it should be removed to the Mote Hill or Hurley Hawky; and (3) That it should be placed within the new cemetery grounds on the Gowling Hills. In this case it would be placed on a pedestal with a suitable inscription, and would require no further protection. If removed to the Mote Hill or allowed to remain *in situ*, there was a general feeling that some protection was necessary, and Mr Allan, architect, had been asked to draw up a plan of a cage which would effectually protect the interesting relic from the hands of curiosity hunters. He might add that there was no historical anomaly in removing the stone from its present position, as it had only comparatively recently been placed where it now stands. For a very long time it occupied a position near the Bridge, where it was used by a butcher as a block for chopping off the horns of sheep. After it was protected the Town Council would be asked to take charge of the stone, but the credit of moving in the matter would remain with the Archæological Society. It must, however, be understood that no definite conclusion had been come to as to the place where the stone would finally be placed, and at a later period of the meeting Ex-Dean of Guild Shearer emphasised this statement.

Dr Galbraith now introduced Mr Allan, architect, who read a paper on "Art—Ancient and Modern." At the close the Chairman moved a vote of thanks to the essayist for his extremely thoughtful paper, which embraced a very wide range within its scope. He was sure all had listened with the greatest interest and pleasure, and that they were greatly indebted to Mr Allan

for the care which he had bestowed in the preparation of the paper. The Rev. Mr Mure Smith in equally eulogistic terms, spoke in favour of the motion, which was carried unanimously.

Mr Gilbert M'Dougall read "Notes upon Cardamine pratensis 'Sport,'" a specimen of which was laid on the table for exhibition. Mr Sinclair, secretary, announced that a joint excursion with the Perthshire Natural History Society to the Pass of Leny had been arranged for Saturday the 6th August. Members desirous of joining the excursion would please communicate beforehand with Mr Sword. The usual vote of thanks to the Chairman concluded the business.

NOTES UPON CARDAMINE PRATENSIS "SPORT."

(By G. M'Dougall.)

Visiting Polmaise gardens one night last week I had a turn round the place accompanied by Mr Ritchie, the gardener. When passing the east end of the pond, which is situated in the north portion of the garden, I was struck with the fine display produced by *Cardamine pratensis*—cuckoo flower. I said the white variety is not very common, upon which, Mr Ritchie said, here is a plant. Upon closer investigation we found that about a fourth of the whole was composed of the white and a slightly united variety, the prevailing colour is lilac. When walking along the south side of the pond, our attention was attracted by a spike of a denser lilac and more massive flowers than any other we could see. It was soon transferred from the plant to the hand for examination, when, to our surprise the flower was double, which at once accounted for the massiveness of the spike, and deeper colour of the flowers. The plant was next transferred to my coat pocket, and when I came home planted to see if the variety will be constant under cultivation. Double varieties of our native flora are occasionally collected; but what most interests us in this form was not only the double flower, but how that double flower was formed. In the usual formation of double flowers the petals are multiplied, or the stamens are converted into petals, or it may be, by the combination of both, all the petals being attached to the base of the ovary. In the variety under consideration the 4 petals and 6 stamens have nothing unusual about them, they form the regular flower. The peculiarity is, that

the stigma is converted into a foliaceous bract, forming a double flower upon the point of the ovary. This is to me an uncommon way of flowers doubling and so far as I can remember, the only instance that ever came under my observation. Also, it is a beautiful illustration to show that all the parts of a flower are composed of leaves in an altered form, which, at times, are susceptible of being transformed into leaves without the gay colours that give charm to the flowers.

ART, ANCIENT AND MODERN.

(By J. Allan, Architect.)

The man, or men, who first observed the peculiarly nutritious qualities of the corn plant that is now almost co-extensive with the diffusion of man over the globe, and may be said to be the basis of all other cultivation and civilization, and who found out that by the riddance of other plants, *i.e.*, by the segregation of this corn-plant, and the crumbling down of the soil on which it fed, this elect vegetable was nourished into larger size and richer quality, and who applied this knowledge or science by clearing out a piece of ground, breaking down its clods and planting the favoured vegetable in the plot thus prepared and exclusively appropriated to it, may be said to have accomplished the earliest work of art. Husbandry or tillage of the soil, the only labour assigned to our first parents in the primitive garden is therefore the earliest of all arts, the parent of all other arts. In point of fact the word "art" means primarily culture of the soil. "Art" is an old German or Teutonic word meaning ploughing. Even at the present day the Germans call a ploughed field "art-acker" (*i.e.*, art acre or ploughed acre), "art-field" (*i.e.*, ploughed field), or "art-land" (*i.e.*. ploughed land). We still speak with perfect propriety of agriculture as an art, and say, somewhat redundantly, the art of agriculture. This primary art of agriculture, whence all other arts have been developed, has accordingly been made the common or fundamental name for all the other successive elaborations of nature, which are all alike called "arts"—such as the art of domesticating and rearing animals attributed in Genesis to Jabal, the art of working in metals attributed to Tubal Cain in the Jewish tradition; the arts of fishing, building, spinning, weaving, navigating, barter, and the much higher art of making exchanges through the medium of a common denomination of value called "money"; the art of

dancing, or regulated, recurring, and pleasing foot movements; the art of singing or producing regulated, recurring, and pleasant sounds of the voice; the art of language or the establishment of common names for the various objects which men have to deal with in common; the art of grammar, or the due regulation of words and letters; the art of composition or the correct expression in words of a complete thought and the methodic arrangement of thoughts (an art much needed on the present occasion, if it were not so difficult of application); the art of numbers or the disposal of things under the exclusive consideration of their distinctness from one another in space; the art of commerce, or the transfer of commodities from where they are not or less needed to where they are more needed; the art of copying or drawing; the art of painting, of sculpture, statecraft, government, and so many other arts coarse or fine, liberal or illiberal, useful or ornamental. The distinction of the arts into the two classes just referred to, of useful and fine or such like, grew of course when civilisation was so far advanced that all activities of the abler men in a State or definitely organized community, were not directed solely to the satisfaction of immediate physical wants, such as the want of food, of clothes as a protection against cold or injury to the skin, of houses as a protection against rain and storm &c.; but aimed also at the satisfaction of more refined and higher desires, the delight and exhilaration of the senses, the exercise and delight of the intellectual faculties, the sense of harmony, beauty, &c. The arts which respected more immediately the satisfaction of physical wants or physical comfort come to be called the useful or industrial arts; while those which respected more immediately the higher senses and aspirations of man, the sense of the beautiful, the holy, the religious, &c., were termed the fine arts. Architecture, building so far as it merely concerns protection from rain and the assault of the elements, cooking, dyeing, weaving, carpentry, tanning, shoemaking, boatbuilding, navigation, &c., &c.; these are the useful or industrial arts. Painting, music, sculpture, poetry, the drama, rhetoric, eloquence &c.; these are the "fine arts." The fine, however, just as much as the useful arts originated in a real earnest over-mastering desire or want on the part of man. The due satisfaction of the religious sense or the sense of the beautiful may become as tenable a necessity as the satisfaction of hunger for material bread, or thirst for material

water. The fine arts were, indeed, originally all the instruments and vehicles of the most powerful or transcendent sense in man, that, namely, of religion, or the recognition of a supreme power — in relation to whom man's only attitude is that of devout adoration and worship. Architecture in ancient times, so far as it was a fine or noble art, was almost exclusively concerned with the erection of temples to the gods. Down even to comparatively modern times, in Christian countries, the highest architectural art was inspired by the Christian religion and devoted to the erection of those beautiful abbeys and sublime cathedrals which still form the chief ornament of the face of Europe, and the very ruins of which are jealously guarded as sacred. All the classic sculpture again, was but the realisation in stone of the ideas noble men had of the shining and majestic gods: the young radiant Apollo, the cloud-compelling Jupiter, the lovely Venus, the wise Minerva, the chaste huntress Diana, &c. These old sculptors, not having yet found the easier expression of writing and printing, and constrained by an imperative necessity to give outward and tangible embodiment to their vital conceptions of the great gods, shaped the plainest marble into the bright and perfect representations, the remains of which are still attractive to modern eyes. Christian sculpture likewise was also devoted to the representations in stone of Biblical and Christian figures and parables: Adam and Eve, the Fall, the Flood, Noah, Moses, the wandering of the children of Israel, King David, Christ and his apostles, the transfiguration, &c., and the temple which should fitly contain and embody these. As everybody knows. the very form of the Christian Church is derived from the cross of Jesus Christ. Music too, was first all, or mostly all, to the praise and glory of the great gods. Such was music among the Jews, as we read in the Old Testament. Such was music for the most part in the days of Homer among the Greeks. The noblest music we have at the present day, too, is undoubtedly the deep old church music which is of a character and quality homogeneous with that of the church architecture. In like manner all ancient poetry is more or less immediately inspired by a distinctively religious sentiment. Such is the poetry of the two most perfect poems in all literature, the Iliad and the Odyssey. And, as most of the church-going people are aware, the psalms of David, the king poet (the Burns of

Israel) are in large part of a religious nature. The Sanscrit literature of the ancient Indians, whether prose or poetry, is all alike religious. The Teutonic Sagas and Eddas of our forefathers likewise partake of this religious character. The ancient drama among the Greeks and Romans was but the dramatic representation of religious and ethical themes. In our own country, both England and Scotland, down to the time of Henry VIII., in England, and beyond that date in Scotland, the drama was an instrument wholly in the hands of the priests, and was devoted exclusively to church plays, to miracles and moralities. And Shakspeare, while liberating the drama from the fetters of the Church, did not degrade the theatre into a place of idle amusement. Shakspeare's drama was a serious business of quite vital moment. His plays were the only popular representation at the time of the history of England, and furnished mostly all the popular instruction and edification to be had outside the Church. Shakspeare's dramas were in the most essentially connected with the life and business of the England of Shakspeare's time.

If now we compare modern with ancient art, it must at once be acknowledged that the supreme religious sentiment which once inspired, no longer inspires it, at all events not nearly so immediately and so exclusively. Art is no longer in such immediate connection as it once was with the real wants and practical life of man. Art is no longer as terrible a necessity as the necessity of food to a starving man, of drink to a woman famishing of thirst, but has grown to be deemed more or less in the light of a luxury or a pleasure reserved for the rich and favoured class. Art is no longer so original as it once was, but more and more traditional and imitative of ancient and past art. Modern art in poetry, in painting, in sculpture, in music, in eloquence, is disposed to choose its subject, not out of the actual life and real living interests around it, but out of some time and place as far removed as possible from the actual. In poetry, modern art is not inspired by the personage and achievements of the present, but trills away safely at the idylls of some King Arthur who lived long ago and whom no living soul knows anything certain about. In music, the modern artist sings the Israelites crossing the Red Sea, a scene the artist cannot pretend to have seen himself, but which happened who knows how many years ago, and some two thousand miles away from

home. Or he shrieks away at the Tishbite and Mount Carmel, or he is hugely taken up with Lohengrin, or his fancy is all for the wandering Dutchman. Anyhow his fancy is sure to be an enormous distance away from home, and at some time when his great-great-great-great-grandmother was not yet within many hundred years of being born. In painting again, modern art takes to the garden on the Mount of Olives, or to some allegorical Bride of Life, &c., but misses altogether the actual things under its eyes and nose, the actual great Britain and Ireland which vitally concerns us all. And so with the drama and the other fine arts. One can understand, if not quite sympathise with, Carlyle's prayer, "May the devil fly away with all the fine arts." But to pass from this too general comparison of ancient and modern art, let us cast a few hasty rambling glances into the arts of different times and different nations. The vastness of the subject, wide as the world and extending through all ages since the days of Adam and Eve in the garden, will not admit of anything like methodic treatment within the limits of one brief paper. Indeed, on reflection, it seems to the reader of this paper that he owes an apology to the Society for choosing a subject almost boundless in space and limitless in time to compress into the narrowest compass of one brief paper. Let us now glance at the art of some of the different countries—

IN AFRICA.

In Africa the negro and native South African hut generally takes the form of a hay stack of circular build, with mud walls, above which rises a roof woofed and warped with poles and bamboo, and covered with palm leaves or grass. The conical stack shaped roof overhangs the walls so as to shelter from the blazing sun the inmates who squat on a mud floor hardened with chips of stones and overlaid with successive deposits of refuse shell and bone. In such a magnificent palace the African lays himself to sleep supremely satisfied. His luxurious pillow is composed of pliable sticks resting on cross pieces of wood. The peculiar advantage of this singular pillow is, as travellers tell us, that if a loving couple happen to fall out during their curtain or rather uncurtained lectures one can hardily chastise the other simply by laying hold of one of the sticks. As we advance from the interior wilds towards the more civilizing seashore, the style of the habitation improves by

introduction of locks and keys. The most ingenious lock-contrivance comes down to us from the Egyptians, whose principle has been adopted by other nations from time immemorial. Then the pyramids of Egypt are classed among the old structures of any pretensions in the world. The largest (Djizeh) is about the height of Arthur's Seat, and covers something like an area of 11 acres. Recent excavation has revealed a sand glutted chapel and altar between the paws of the Sphinx. The enormous rock boulder, of which the Sphinx is formed is chiseled into the appearance of a lion couchant, surmounted by a Africo-Arabic head with a feminine moonish face. The head of the Sphinx is hollow to allow, it is thought, a concealed priest to deliver oracles.

IN ASSYRIA, EGYPT, GREECE AND ITALY

Too, we find ruins of building of enormous size and beyond description, in which there are blocks of stones so enormous that the people of the 19th century with all their modern appliances are still puzzled by the problem of ancient quarrying, transport, and placing in position. At a quarry near Baalbec, within 40 miles of Damascus a stone lies ready for transport to this day, measuring 70 feet long, 14 feet by 14 feet and weighing about 1135 tons. The temple of the sun near this place contains among its ruins 3 blocks of stone 10, 13 and 66 feet, the lineal length of the 3 stones put in a row would measure nearly 200 feet.

INDIA.

The domestic architecture of India is not of a very enduring kind, the huts among many of the native tribes being made with posts, bamboo, palmetto leaves and wild grass. Among the more barbarous tribes the huts are raised on piles over lakes and on elevated spots on land. They are of such an elastic construction, as would best suit the shocks of earthquake that frequently occur in these parts. These dwellings correspond with the rude habits of the natives. Tables for food or chairs to sit on are not required where people, chief and subject alike, sit on the ground. Clothes are not much needed in warm climate, unless as a protection from the bites of mosquitoes. Forks and tools used in civilized countries for eating are of little use among savages who find their fingers more to the purpose. There are some extensive caves and underground habitations suggested by a hot climate and practical indolence. More advanced tribes have extensive

myriad-pinnacled and columned temples of a showy nature peculiar to themselves. But in point of fact the history of India runs through all peoples and through all civilizations.

AUSTRALASIA.

In 1770, about 117 years ago, when Captain Cook discovered and explored the eastern shores of Australia, the native Indians were found to be entirely naked (as they are still in the interior wilds of Australia and New Guinea). "The inhabitants seemed to be like other animals to be scattered along the coast, and in the woods," only, instead of tusks and claws with which wild beasts are provided, "they had canoes and lances for taking fish." Their huts were of the most primitive type, and contained grass heaps on which the inmates slept. From the remnants of shell and bones lying about the vacant huts, it was evident the natives had an inborn taste for the ornamental, elegantly indicated by holes in their nostrils and ears for the reception of osseous ornaments. The huts of the aborigines of Australia may be generally described as having roofs supported on 4 poles, thatched with grass, open below to the four winds of heaven, but many are also found built in the form of cones with long poles meeting at the top, warped with pliable wood and coated over on the outside with clay, the entrance being of such a size as only to admit one person at a time in a crawling posture. Many of the more savage tribes are pleased in a sandy district to burrow in the soil, others are like the birds building a nest, or tent, thatched with grass, which they renew every year at the approach of the rainy season, coating it like the birds with clay.

BRITAIN.

The aborigines of a country who have lived from time immemorial by the chase, are displaced by more crafty squatters, who have learned the art of domesticating, breeding, and rearing cattle. The pastoral farmer, like the patriarch of old is in possession of a number of goats, sheep, and cattle: these graze on and increase, land is appropriated, adding daily to the wealth and position of the patriarch, and providing his household with the products of labour, such as milk, meat, and clothing. Round his household gather slaves, vassals, and hirelings. Passing onwards through moil and turmoil towards the Norman Conquest we come to Henry the 2d when the Saxon element was reasserting itself, and the English language was

assuming its present form. Contact between the Normans and the Saxons of the country caused a style of architecture to be generated, which is a cross between the Norman and the Saxon, in some aspects like each of the parents, in some unlike either. As people began to understand each other in Saxon-English, a pointed early English style of architecture was provided, the perfection of Gothic or Christian art. Towers and steeples vocal with bells were added, sometimes separated from the main body of the church, that the sound might not impinge the sacred edifice, while the bells so situated would more freely cast their peals to the surrounding residenters. Monastic institutions had also grown up: the monks quicken the art of agriculture, work mineral, freight ships, and propagate both the industrial and fine arts. In the first half of the 16th century a fierce war against papacy and papal architecture raged over the land, whereby monasteries were suppressed, their property confiscated, some demolished for their material. Now, with regard to domestic architecture in early times it was the custom to have the fire in the middle of the floor or hall with a central opening for the escape of the smoke, a custom which still lingers in Highland cots. Chimney shafts were, probably, not used to any extent before the 10th century, and not for long after do they become anything like general. In many parts of Ireland and Scotland there are still to be seen dwellings of the most simple construction, suited to the few wants of the *artless* inhabitants. Standing on the edge of a moor in Skye, miles from any other dwelling, I remember going into a shepherd's shealing out of curiosity. The house walls were formed with fail or turf and roofed with rushes. There was a door but no window. The peat fire was in the middle of the floor, over which was an opening in the middle of the roof for the exit of the reek. But the peat reek was not always disposed to go out at the roof, like a burglar, but in large part went out by the door, like a respectable visitor. This is a sample of many houses of a similar description, such as I have seen in the Highlands and Ireland. The American Indians at this day have their wigwams covered with beasts'skins killed in the chase, with their fire in the middle of the floor. These Indians have their tomahawk, scalping knife and long lance, a bone hoe, and a birch canoe, and worship the evil one, the Devil, that he may not hurt them; the Highlander has his spade, his girn, his staff and his collie, and prefers

a good "still." But what has this reference to the wild American Indian and the worthy Highlander to do with art, ancient and modern, unless to show that art rude or civilized, ancient or modern, is the product of circumstances?

Having thus glanced briefly at the art of some of the different countries, let us now touch on architecture proper, some of the old masters, and in conclusion consider our position in relation to technical instruction. Concerning architecture, each nation builds to meet its own peculiar circumstances; the styles of architecture are therefore as varied as they are numerous. Under the Prehistoric period we have Phœnician, Celtic, Pelasgic, and Etruscan; under Barbaric we have Egyptian, Persian, Indian, and Mexican; under the Classic we have Greek, Roman, Latin, and Byzantine. The Roman runs also into what is termed Arabian, Romanesque, Gothic, and Renaissance; classic revives and runs through modern Florentine, Roman, Venetian, and Persian. Speaking roundly, architectural art divides itself into three prominent parts or styles, termed prehistoric, classic, and Gothic. Leaving the prehistoric period out of the count, we have two prominent and distinct styles or periods in the classic and Gothic; the former may be said to represent the old dispensation, while the latter may be said to represent the new dispensation. The Pantheon or St Paul's may be taken as representing the Roman classic style, and Notre Dame as representing the Gothic or Christian style. To take a simile nearer home, we have the Smith Institute here on its frontal portico representing classic art, and the East and West Churches representing Gothic art. The North Established Church represents Norman art, while the North Free Church, with its massive spire, early English. The peculiarity of the Gothic or Christian style, is that it appropriates all styles of architecture and sends out many offshoots, among these offshoots are the Anglo-Saxon, Anglo-Norman, semi-Norman, early-English, decorated-English, floriated or perpendicular, debased-English, and so on. A distinguishing feature between the classic style, with its colonandes and columns, and the Gothic style, is that buttresses and flying arches take the place of columns and colonnades. The classical period partakes of five styles of architecture in the following order:—Tuscan, Doric, Ionic, Corinthian and Composite, these orders are the development of ages culminating in the Colloseum at Rome. The columns of these orders present a cer-

tain graduation in the human figure; the Tuscan and Doric represent sturdy labourers always placed lowermost in a building and bearing the superincumbent weight; the Ionic and Corinthian have softened into feminine beauties elevated to the summit; the Composite represents the union of all the previous styles, giving at once tender ornament and majestic dignity to the fabric. Before leaving the *classical period*, the period of *Grecian perfection*, I may relate a beautiful story told of the origin of the Corinthian capital. A beautiful young damsel of Corinth was betrothed, but before the marriage celebration took place she fell ill and died. After she was buried the curiosities that delighted her when alive were collected and tenderly placed over the grave in a basket, and the basket was covered with a tile; under the basket there happened to be an acanthus root which grew up all round the basket curling round the corners of the square tile. This was observed by her lover, Collimachus the sculptor, who inspired by this singular product of nature and accident, chiseled in marble the first Corinthian capital, the perfection to this day of classic art. The pliant acanthus has also been freely used and wrought into modern Gothic designs as you may notice on comparing a severe *classic capital* with a free *Gothic one*. But the fact is the Gothic style is so wide in its scope that it ornaments itself with all classes of animal and vegetable subjects. Just a word on some of the old masters: Phidias perhaps the greatest sculptor of ancient Greece was born 490 B.C. died 432, flourishing during this time when Greece was under the rule of Pericles. This ruler employed Phidias in restoring many of the buildings and sculptures destroyed by the Persians. The colossal statue representing Jupiter, of ivory and gold, about 60 feet high is said to have been his masterpiece. The statue was so life-like that one almost fancied on approaching it that it might speak. Phidias had, however, presumed to carve on it his own image and that of his lady love, besides the likeness of Pericles. For this impiety he was cast into prison as the reward of his transcendent genius. Leaping across a very wide interval we come to Michael Angelo, the sculptor, painter, architect, and poet, a man richly endowed with divine qualities rarely combined in one and the same person. Born at Chiusi in Italy in 1474, and dying at Rome 1563, he flourished when Christian or Gothic art was at its zenith. The genius of Michael Angelo is

purely natural, independent of traditional rules, and producing works indicative, above all, of masculine strength. In his paintings he expresses all that is delightful and grand. His "Last Judgment," in the Sistine Chapel, about 70 feet high, is a masterpiece of painting. He wrought hard and silently all his life. He was frugal and temperate and when reproached for his solitary life said "L'art è geloso e domanda l'uomo intireo"—art is jealous and requires the whole and entire man. Contemporary with Michael Angelo, Raphael, born at Urbino, 1483, died at Rome on 6th April, 1520, on the anniversary of his birthday. Raphael interprets the poetic beauties of the old and new dispensations, displays his inspirations on church walls and canvas, gathers up all his experience, and spends all the wealth of his nature at once physical and spiritual, human and divine, on the "Transfiguration." Raphael's art is nature alive and animated. What he paints is poetical, natural, eternally true. Palladio the Italian architect, born 1518, two years after the death of the great Raphael, died 1580. He is considered the Raphael of architecture. Polladio grasps the art of the ancients as a whole, carrying it forward to suit the practical requirements of his age. He imparts to art new life and individuality, in which the useful and the beautiful are unified. Tintoretto flourishes in the middle of the 16th century. This Venetian admired the simplicity of black and white now so fashionable for etching. He concentrates his thoughts on the Virgin Mary as the Queen of Heaven with her infant as her crown, surrounded by angels, patriarchs, prophets, saints, apostles, and priests. Thus has art its epochs, its masters, its styles, its perfections and again its decline.

LATTER DAYS.

However necessary it may be to become acquainted with all that is good of the past, it is not desirable to many to copy it. How many study the old masters and merely repeat, merely imitate. A wise man gathers up the fragments of the past, not that he may repeat them, but that he may infuse into them the new life of the present. A real artist does not require to repeat or follow anyone, and his work possesses more than is seen; the composition tells its own story, in its own way, as a tree speaks of a tree, or a hill of a hill; the parts come together in the frankest, freest, and happiest manner, without ostentation, self-conceit, or vulgarity; the spirit

of the author permeating unconsciously every part, and still not egoistically obtruded but rather concealed. Why are there so many eyesores in ordinary buildings? Because objects such as projections, roofs, openings, and blocks of buildings are not studied with the least idea and proportion, or grouping, or as whole. Said Apelles to his pupils after the pupil had printed Helen of Troy, "So because you could not paint her beautiful, you have made her rich." Pope has said—

> "Poets, like painters, thus unskilled to trace
> The naked nature and the living grace,
> With gold and jewels cover every part,
> And hide with ornament their want of art."

Kames has also said—"The best artists have in all ages been governed by a taste for simplicity. How comes it then that we find profuse decoration prevailing in works of art? The reason plainly is that authors and architects who cannot reach the higher beauties, endeavour to make up for a want of genius by multiplying those that are inferior." Ornament must not be stuck on anywhere and everywhere, but must grow naturally out of the conception. Simple people imagine that ornament must be ornament without any regard for congruity. It is, for example, as distressing to a cultivated eye to see semi-circular funereal draped ornament ignorantly stuck along a frieze, or round the neck of some oriel window, as it is to see a classic door-piece stuck on to a Gothic building, out of all taste and keeping with the style of the fabric; as it also is to see the one petrified idea of a mongrel roof repeated and stuck on all classes of work, without any regard whatever to style or congruity. Real art presents itself in a piece, the one part growing naturally out of the other; the parts are conditioned by the whole as the whole is conditioned by its parts, a conception that is at once harmonious and pleasing to the sense and mind. Taste generates beauty, beauty gives birth to enjoyment in turn, adds commercial value to art. Considering what has been said, I may add in conclusion that day by day the necessity for more and better education in *technical art* forces itself on our attention in view of the fact that foreigners with their superior art-knowledge are outstripping our home workmen. Without a knowledge of art, without a knowledge of materials, our workmen are working in the dark, but allow more light to shine upon their craft, and they will take more interest and pride in their work, and look on their handi-

craft as an art. I consider that it is necessary to provide ways and means, whereby our farmers and artisans may be furnished with more knowledge of their industries, if our industries are to hold their own against foreign competition. Industrial instruction might be given in every village throughout the country. Englishmen are ingenious, but so are foreigners, no sooner does an Englishman make a discovery than foreigners are on the alert with their superior art-knowledge, contriving to monopolise a profit, not only from our ingeniousness, but also from our weakness. Our children compulsorily attend school up to the age of 12 to 14, but after this, in the case of the working classes, there is at present no systematic course of instruction, a defect that is every day calllng louder for correct:on. The voice of commonsense is, however, if slowly, yet gradually, making itself heard abeve mere rant. Sanitary knowledge or the art of health, and exhibitions of collected industries tend to improve the toilers' lot and run in the track of technical education. But this is only a beginning of good things. Patriotism, sympathy with the lot of the toiling multitude and confidence in our national qualities urge us to far greater and more systematic effort in this direction. In the words of Lindsay Gordon the Australian poet :—

"Life is mostly froth and bubble,
Two things stand like stone—
Kindness in another's trouble,
Courage in our own."

The monthly meeting of the above Society was held in the Smith Institute on Tuesday evening, 6th Sept. —Ex-Dean of Guild Shearer presiding. There was a good attendance. The minutes of last meeting having been read by the secretary, Mr Sinclair, and approved of by the meeting, the chairman introduced the Rev. Mr Goldie, who read a most interesting paper on "The Antiquities of the East Neuk of Fife," illustrated by admirable photographs of the principal objects of interest, in the neighbourhood of Crail. A second paper was read by Mr Gilbert M'Dougall on "The History of the Potato," which showed no small amount of research. At the close, votes of thanks were, on the motion of Dr Drew, passed to both gentlemen. Mr M'Dougall also exhibited drawings of the Hessian Fly in all stages of development. The Chairman announced that on Saturday the 17th inst., at 4 p.m., the Heading Stone, which through the personal exertions of Dr Drew, had been restored, and placed on the Moot Hill, would be formally handed over to the custody of the Provost and Magistrates of Stirling to be kept by them for all time coming, and invited all members of the Archæological Society who were interested, to be present on the occasion. Mr Shearer also thanked Dr Drew for his lecture on the Heading Stone, and complimented him on the successful issue of his endeavours for its restoration. A vote of thanks to the Chairman, on the motion of Mr Gilbert M'Dougall, concluded the business.

ANTIQUITIES OF THE EAST NEUK OF FIFE.

(By Rev. W. F. Goldie.)

When I promised to read a paper at this meeting I meant to treat a subject not so far from home, but circumstances—it would be needless to explain how —have altered my intention. My present subject is a wide one, and tempts to digression at almost every turn, but my choice and treatment of particulars must be determined by the spirit and aims of a society like this.

The town of Crail, the capital of the East Neuk, is a quiet quaint place—a typical east coast town—Scotch with a hint of Deutschland about it—not so much a fishing place as some of its neighbours—but thoroughly redolent of the sea. The name, spelt in no fewer than eight different ways, is manifestly derived from *Caer*, a fortified place or castle, and *Ayl*, a corner—the castle in the corner—there having been at one time a castle (a favourite residence of the early Scottish kings) on the elevated corner

or headland above the present harbour, and the handsome villa now occupying the site still bears the name of "The Castle." Sibbald in his "Fife and Kinross," states that David I. died in this castle; but it is known beyond dispute that he died in his own Castle of Carlisle—which belonged to him as Earl of Cumberland—in May, 1153. It has been suggested that the similarity of names, as they were formerly spelled, may have given rise to Sibbald's mistake—*Caryle* could easily be substituted for *Carlyle*, or *Carlyle* for *Caryle*—and you may at this hour, on the Solway shore, hear the English town spoken of as *Carel*. All that remains of the ancient and famous castle is a large boulder of masonary behind a wall and hidden under luxuriant elder trees. A similar fate has befallen a once flourishing Priory, which is now represented by a small heap of masonary on the shore, but the "Priory Well," corrupted into "Briery Well," or, *Scotice*, "Wall," still flows on.

The Town House, according to a stone in the north wall, having the sculptured figures of a ship and three stars, was built in 1603, but the burgh charters are of a much earlier date. Indeed, Crail is said to have been a place of considerable importance in the ninth century. The tower of the Town House is a square substantial structure, Dutch in design and appearance, quite unique, and greatly admired by artists who seldom fail to enter a sketch of it in their portfolios. Provost Peattie very kindly gave us a sight of the old documents in possession of the Town Council. They consist of instruments, charters, attestations, seisins, and three Papal bulls, all of them beautifully written and in good preservation. They are now kept in a modern safe, but the old charter chest of the burgh, made of solid oak and girded with iron, and said to be about 600 years old, still exists. The oldest document is a charter dated 20th April, 1369, and the most recent is dated 26 June, 1755. The bull of Pope Julian II., 7th Feb., 1509, appoints Wm. Myrton to be vicar of Lathirsk. The two bulls of Pope Leo X. are of one date, 5th May, 1514—the one authorising the Abbot of Cambuskenneth to pay to the said Wm. Myrton, from the rents and duties of the Parish Church of Crail, 20 merks Scots, and 15 gold ducats, as clerk of the Diocese of St Andrews, and the other authorising the said Wm. Myrton to admit Alex. Dunbar as vicar of the church of Crail, and to allow him a yearly pension of 20 merks Scots, and 15 gold ducats. Wm., or

Sir Wm. Myrton was a person of importance, and appears frequently from A.D. 1491 to 1532 as receiving grants of money and land for the diocese. By a deed of resignation dated 4th July, 1550, Alex. Meldrum of Dunipace and his spouse Margaret Myrton (probaply a relative of William's), give 20 merks 5 shillings and 4 pence Scots to the collegeners of Crail out of the lands of Dunipace. Under date 24th Sept., 1556, the prebend of Crail is to receive the annual rent of 10 merks 2 shillings and 8 pence from the same lands. From a letter of the Prior of St Andrews it is evident that the priests of Crail were not always reverent, for among other things he "ordains *of new* that the vicar and prebend thereof meet in the said church without talking, murmuring, or laughter, and without vain and vague countenances, but in peace and silence and with all gravity," and strict superintendence is ordered for the future. I am indebted for these particulars to "Fifiana," by the late Mr Conolly, Town Clerk, in which he gives an abstract in English of the documents referred to. The work, although a *rudis indigestaque moles*, contains valuable information. But it is rather strange, in a "Biographical Dictionary" of Fife men to have a notice of Thomas Carlyle because he was for a time a teacher at Kirkcaldy, and not a notice of Thomas Chalmers, born at Anstruther, perhaps the greatest man that "the kingdom" has produced.

The Parish Church, built in the reign of David II., is in good preservation, the south side, however, is recent. It was in 1517 on the petition and endowment of Sir Wm. Myrton, with the consent of the patron the Prioress of Haddington, erected into a collegiate charge with a provost, sacristan, ten prebendaries, &c., and had nine altars endowed and perpetually served. The architectural style of the building is early English, resembling in this respect, but of smaller dimensions, the West Church of Stirling. The tower, however, is older than the church and seems to have been connected with a former building. Some of the old oak pannellings, with carvings and mottoes at the end of the pews, on the wall, are as fresh as if they had been the work of yesterday. The pews, which are of a comparatively recent date, are about as ugly as it is possible to conceive. An old cross of redsandstone elaborately carved in the Celtic fashion with figures of animals around the shaft, and the legs and part of the body of a man supporting the cross, has been built for preservation

into the west end wall under the tower and inside the church. It is supposed to be the old cross of Crail, to which healing virtues were ascribed, pilgrimages being made to it in pre-reformation times. In this church, according to tradition, in the year 1559 just on the eve of the Reformation, John Knox preached so powerfully against Popish idols that the people rose and made havoc of the churches and images throughout the district, including in their destructive fury the beautiful cathedral of St Andrews. The reformer, however, was not to blame for all the doings of what he called the rascal multitude. He was neither bigot nor vandal, and was much more liberal than many who assail him. He had a great work to do in emancipating and educating human souls, and he did it, and made many things, among others, societies like our own, possible in Scotland. Dr M'Crie sarcastically says that antiquarians should be the last class of men to condemn him, seeing he ieft the old buildings in that condition in which they (the antiquarians) like best to have them—in ruins.

Another prominent man in Scottish history, James Sharp, was minister of this church when he was made Archbishop of St Andrews. Probably he had been a happier man had he remained minister of Crail, and certainly his career had not terminated so tragically. The Rev. Mr Reid, the present minister of the church, most kindly showed us the old session record in which there is a minute of date 15th April, 1648, concerning the appointment of a schoolmaster, and signed James Sharp, the only minute with his signature. Mr Reid also submitted to our inspection an account book belonging to the Archbishop, recording his expenses, the places at which he lodged, and other matters, on a journey to London in 1663. At that time the rule of Lord Middleton—"The Drunken Earl"—had become unbearable to the Scottish people, and as it was suspected that the Government in London was about to supersede him, it is thought probable that Sharp, who owed everything to the Earl, had undertaken this journey to plead his cause. His efforts, however, were unavailing, for Middleton was banished forth of the kingdom, and Lauderdale took his place.

Before leaving the church I may refer to the inscriptions which the Provost says were in former times on the Trade's Lofts. On the Tailor's Loft—

"This ancient trade, since Adam was a rebel,
Justly deserves the head of all the table;
For first, in Paradise it did begin,
Which reminds us all of our original sin;

But since that sin the case has altered so,
Were it not for tailors, we would all naked go."

On the weavers' loft—"The coat was without seam, woven from the top throughout." "Weave Truth with Trust." On the carpenters' loft—"Is not this the carpenter, the son of Joseph, whose father and mother we know?" I think the weavers had the best of it. The church with its square tower stands among the trees in one of the most beautiful and well kept churchyards in Scotland. The imposing monuments to notabilities around the walls but now decayed and their inscriptions almost effaced, are well worth the attention of archœologists. Of the epitaphs in the churchyard let me quote the last lines of one of them, in which the sentiment is neatly expressed—

"Death that does sin and sorrow thus prevent,
Is the next blessing to a life well spent."

This is a contrast to the following on a large tombstone on the wall—

"Here lyes interred before this tomb,
The corpse of Bailie Thomas Young,
Ane honest man, of good renown,
Three times a Bailie of this town!
He sixteen years Convener was,
But now unto the dust he lies.
The 20th October born was he
In 1683.
And died December, interred the eight,
In anno 1758.
So he with great composure left this stage.
Isobel Martin, his spouse, doth lye here,
As also six of their children dear."

There are Caves of special interest at the shore. King Constantine's cave is about two miles east of the town. Proceeding along the shore you come to a huge rock, which towers above the rest, and is called Kilminning Castle. On the rising ground to the north is Kilminning farm, where a cell or chapel was dedicated to St Minan or St Monan, the cornyard of which (according to the "new statistical account") is still full of graves like a regular burying-ground. The Rev. Mr Reid drew my attention to a boulder on the shore near by, with a trough apparently hewn out around the rim, and a cut at one point as if to drain off any liquid that might be in the trough. He said, some people, of whom he was not one, believed that it was a Druidical altar. Those who entertain that idea must be more antiquated than antiquarian. On such shores, however, it is sometimes difficult to say what is natural and what is artificial. For instance, on the shore of Crail there are several apparent human foot-

prints, and one of them, on a rock above the shore, is so perfect in shape that, were it not so large, you would take it to be artificial. There are in this country what are called *tanist* stones, of which I know almost nothing—but I have seen it stated that in early Celtic times a new chief or king elected from a particular family was installed into office by his putting his foot, as his predecessors had done, into a large footprint hewn in a rock, thus declaring and pledging himself that he would follow in their footsteps. As I have said, I know almost nothing about it, and I only mention it now in the hope that some one will be able to throw light upon the subject. Only when we came upon such things as supposed Druidical altars and upon footprints let us be chary of conclusions as to their origin being either natural or artificial unless the evidence be strong.

King Constantine's Cave is situated in the pretty little bay of Balcomie, with its beach of white sand. It was here that Mary of Guise, wife of James V., first set foot upon Scottish soil. She remained overnight at Balcomie Castle in the vicinity, and was married next day at St Andrews. That landing and that marriage had unhappy results for Scotland. Nobler lives have gone down at the terrible Carr Rock, which is the western boundary of the bay. This Mary was the mother of Mary Queen of Scots, whose beauty and history still fascinate men—but with opposite kinds of fascination. Poor Mary, sinning much and wronged much—greatly bepraised, greatly bespattered—why will they still mock her? why don't they let her alone? She will harm nobody now.

Constantine's Cave, evidently scooped out by the action of the waves at a very remote period, is now a few yards above high water mark. The dimensions of the cave are about 12 ft. wide by 15 ft. high. The floor is some feet higher than the ground in front. The crosses cut in the walls—some of them modern, but others of them very ancient—indicate occupation by Christian men. But if, as Sir James Simpson says, there are figures of two deer-like animals on the walls—certainly there are markings which are not crosses—we are led back to pre-Christian times and heathen occupation of the cave. The mouth of it has been undoubtedly walled up as a protection from the sea. Some sixty years ago a number of stone coffins in regular rows and containing entire bones were dug up at this place. These coffins were of course long subsequent to the times of the Danes

and of the Culdees. George Buchanan and tradition agree that Constantine II. king of Scotland, after a tough battle with the Danes, was put to death by them in this cave A.D. 874. Others would have it that Constantine died in peace elsewhere, but there is no sufficient ground for this latter opinion. The Scots and the Picts had been united under Kenneth Macalpine, who was lawful heir to both crowns, but according to tradition he had to make his claims good by conquering the Picts in a battle fought on the plain near Cambus-Kenneth (hence the name), his camp being on the braes of Tullibody. But the Danes were strong in Britain and Ireland at that time. They held, among other places, Dublin in their possession, and issued from thence to harry and harrass the Western coasts of England and Scotland. They had a camp at Fifeness, which they held against the united forces of the Scots and the Picts; the remains of the fortification are called "The Danes Dyke." Conceive a triangle the apex of which is the Ness advancing into the sea, the two sides being the shore, and the base the Danes dyke. This dyke much changed in the course of centuries is now level on one side with the fields, and on the other, the side next the sea, is a sunk fence several feet deep built of stones. The foundation stones were probably laid by the Danes. Within this dyke they were protected from attacks by land, and the sea was open to them. They must have been very troublesome neighbours, and it was in attempting to expel them and consolidate his kingdom that the Scottish king was conquered and slain by them.

The *Caves or Coves of Caiplie* are fully a mile on the other side of the town. You are almost at them before you see them. While the largest cave forms the west cheek of a headland, the other caves stretch out from it, and stand up clear from the green sward like the ruins of an ecclesiastical building. Some of the caves are little more than "entries" through the rock from side to side. They have been scooped out of the white sandstone splashed with red, by the action of the waves at a remote period even according to geological reckoning. Beyond the space of green sward in front of them, there are huge masses of rock coming in between them and the sea, whose highest mark must be 30 yards distant. The outward appearance of the caves is striking and peculiar. There seem to be two pairs of gigantic human legs, as if they were about to start forward, from which the body has

been cut off by the loins. There are two rather well formed human faces—the one with an indistinct body attached to it, and the other, on the westernmost peak, is a good profile of Punch with chin, nose, eye, and eyebrow, the old humourist gazing at the Isle of May as if he were seeing something that tickled him there.

The largest and most interesting of the caves bears the name of the *Chapel Cave*. It narrows to a point at some 40 yards from the mouth into which you could easily drive a horse and cart. The roof, on a shelf of which at the time of my visit, a pair of rock pigeons had built their nest, may be from 25 to 30 feet high. The mouth of the cave has been artifically enlarged and there are traces of a seat cut out of the rock on the left. The large cavity in the roof on the right was probably a bed chamber approached by rude steps. As in Constantine's cave, a wall had been built in the mouth of this cave, and in order to obtain ingress and egress, a door in the early Saxon style was cut in the western wall, admitting to a smaller cave which resembles a town entry. So the dwellers were protected from the weather and from sudden surprises. Mr Hay Fleming, on the authority of Dr Stuart, in his *Sculptured Stones of Scotland*, says, that when the rubbish was cleared out in 1841, "the floor of the cave was found to be of clay; and outside the remaining portion of the wall which had closed its mouth, there was another and lower foundation of three courses of huge stones, about from four feet high, forming a terrace four feet broad in front of the cave, and joined to the rock on each side." Numerous crosses are cut on the inside walls, some modern and rude, but others undoubtedly ancient and beautifully executed. One is said to be a Greek cross surrounded by a line but it is too high up to be distinctly seen from the floor. Then you observe a number of holes hewn in the rock about an inch and a half deep—could easily let in a lady's hand—several inches apart and on opposite sides of the cave. Sir James Simpson, in his essay on cave sculptures in Fife, says—"The caves of Fife, both those that have sculptures and those without them, have almost all occasional perforations or holes cut in the course of their angled or projecting ledges, as well as in their flat floors and roofs. These perforations or "holdfasts," seem fitted for a thong or rope to be passed through them, as if they were intended to suspend or to affix objects. The middle portion or pulley of the holdfast is often worn quite smooth, as if by the friction of the rope or thong,

very often it is quite worn through and broken off." The middle portion, which, Sir James speaks of, is awanting in all the holes of the "Chapel Cave," which, he seems never to have visited, because he speaks of it as near Elie, and they may have been used in other ways and for other purposes (than he speaks of) at a later date.

The other caves are cavities or "entries" through from side to side with the exception of the cave on the east and just under the headland. It is much smaller than the Chapel Cave. The floor had been made partly by levelling the sandstone and partly by huge slabs. There are on one side traces of a cistern. "In front of this cave (to quote once more from Dr Stuart)" and about two feet below the surface, a human skeleton was discovered, as if thrown head foremost into a hole ; and a little nearer to the sea, other four skeletons were found, as if they had been regularly buried east and west, the heads to the west but without any appearance of coffins, the human bones from being in various states of decay, appeared to have been buried at several times. An offensive smell was felt on opening the graves."

It may be regarded as certain that the first occupants of those caves were wild beasts, some kinds of which have been for ages extinct. Reasoning from what we know of similar researches elsewhere we may conclude, from the bones of cattle, boar's tusks, deer's horns, and other things mixed with earth and stones which were dug up at the caves and within them, and from the peculiar sculptures in other caves on the Fife shore, that the next occupants were savage, or at least heathen, men who lived by the chase. Then judging from the crosses cut in the walls, and from tradition, the third occupants of the caves were Christian missionaries. One of them was named St. Adrian, and is supposed, not with much probability, to have been a Hungarian. Most probably those missionaries were Culdees having some connection with Columba's College of Iona. They were men of simple faith and great self-denial who spent and even laid down their lives for the salvation of benighted and degraded men. In course of time there was a religious establishment on "The May," a few miles off in the sea, and later still the church and other religious houses at Crail and in its neighbourhood. Those early missionaries were among the first to sow the seed from which has sprung this great nation. Perhaps the heathen Danes and other wild rovers of the sea drove the missionaries to "the

May," and took possession of the caves. Again, the mode of burial, and the offensive odour of some of the human skeletons already referred to, would seem to point to deeds of violence, of a more recent date, probably done by smugglers, and the probability is strengthened by the fact that this coast was, until recent times, the resort of smugglers, and the great cave and other caves would be both refuges and warehouses for them. Down to the middle, if not to the close of last century, there were even Christian people of good social position in those parts who thought it no sin to smuggle or have connection with smugglers. The severe and grasping policy of the time produced a state of opinion that was not favourable to respect, for the excise and custom's laws at least.

A word in conclusion upon the geology of the shore. The rocks belong to the lower beds of the Carboniferous Formation. The Old Redsandstone, as I was informed by Bailie Sim, to whom I am indebted for valuable hints and information, not being found nearer than Dura Den. The sea must have receded at a remote period, for there is a strip of level land or "links" along the shore not many feet above sea level, with masses of rock at some places above, and at other places below, the level of the links. Then all along the links, say from ten to a hundred yards distant, there is a boundary or brow of land about the height of a three-storeyed house, interrupted here and there by advancing headlands of greater height. There are alternate layers of flagstone and greyish porous rock, which last seems to have been deposited as mud, in which, as is seen by their fossil remains, trees and other forms of vegetation flourished. Indeed, towards Cellardyke there is a submarine forest, which I was not so fortunate as to see. This porus rock is strangely honeycombed by the waves even when it is the under layer. After the waves have done their work by eating out the lower layer, the superincumbent mass of flagstone sinks down, thus lowering the barrier to the march of the sea, which, if this process continues and nothing intervenes, will again overflow the links as far as the brow of land from which it was driven by the rising of the beach so many ages ago.

Note.—Had time allowed, I might have been more definite about the raised beach, but anything additional would not have materially altered what has been stated.

A FEW STRAY NOTES CULLED TOGETHER UPON POTATO HISTORY.

(By Mr Gilbert M'Dougall.)

In the year of grace that is past, 1886, we have the third revolution of the centenary wheel completed since the potato was introduced to this country by Sir Francis Drake. Sir Walter Raleigh is generally credited with the introduction of this esculent, which has proved so beneficial a dietary article to mankind. But which of the two "Sirs" is entitled to be accredited with so distinguished an introduction, is not the object of this paper any further than to say that they might have acted in consort. Drake may have got it when upon some of his South American expeditions, but whether from the natives where it had been cultivated for ages, or out of a Spanish prize ship, where it would be used as an article of diet is uncertain. Then, when he relieved Raleigh's Virginian Colony, which was founded two years prior to that date, it was carried home in one of the relieving vessels, when, nothing more likely than after the glowing description it would receive from Drake as to the ultimate revolutionizing the food products of this country he would be induced to plant some of the tubers in his own garden.

In looking over a book recently I saw it stated therein that the potato was first introduced into Britain in 1565, again by Sir F. Drake in 1585, and lastly by Sir W. Raleigh in 1623. We know the last date to be incorrect, because Raleigh was executed five years previous to it, therefore we hesitate in accepting either of the other dates as correct. It was in 1586 that Drake after capturing St Iago, and St Domingo, and burning several towns on the coast of Florida, he sailed along the coast of Virginia and found Raleigh's Colony in very reduced circumstances, then he transported them to their native soil.

The Cordilleras of the Andes in South America is its original home, and it appears to have been cultivated by the Incas and other Andean nations from a very remote period over a space of 2000 to 3000 miles. Prescot deduces from the various authorities he consulted the facts that "Whether indigenous to Peru, or imported from the neighbouring country of Chili, the potato formed the staple of the more elevated plains under the Incas, and its culture was continued to a height in the equatorial regions

which reached many thousand feet above the limits of perpetual snow in the temperate latitudes of Europe. Wild specimens of the vegetable might be seen still higher, springing up spontaneously amidst the stunted shrubs that clothed the lofty sides of the Cordilleras, till these gradually subsided into the masses and the short yellow grass which, like a golden carpet, was unrolled around the base of the mighty cones that rose far into the regions of eternal silence, covered with snow of centuries." It is supposed, according to the best authorities, that the potato was unknown in Mexico when first invaded by the Spaniards, and that they introduced it then from some of their stations in South America. Humboldt was of opinion that the earliest cultivated potatoes in Virginia found their way thither, through the earlier and more southern Spanish settlements. Be that as it may, might not potatoes be carried into North America, centuries before the Spaniards got footing upon its shores? Would there not be communication in some form or another between the nations from either end of the Isthmus of Panama? Would there be no trading in some sort of merchandise, or would there be no nation thirsting after conquest in the Western Hemisphere, as there was in the Eastern in these bygone ages so as to have introduced such a staple food, a distance of 20 degs. to 30 degs. further northward?

Mr J. G. Baker of Kew has classified the thirty or more wild forms of tube-bearing *Solanums* known under five types—*S. tuberosum*, the progenitor of our potatoes; *S. Commersoni*, *S. cardiophyllum*, *S. Jamesi*, and *S. oxycarpum*. In this, his latest synopsis, he has reduced *S. Maglia* from the proud position of a species which he formerly accorded to it, to that of a form of *S. tuberosum*. *Maglia* is a wildling from the humid regions of the coast-line in Chili, hence it was thought that if an intermixture of its blood could be diffused into some new varieties raised from our present race by hybridising, it would, to a large extent counteract the susceptibility to disease with which potatoes are at present so liable to be affected. It was expected that by its polen, or stigma, a more hardy and sturdier race would be raised that would revolutionize the potatoes of the British Isles. Being a native of a humid zone, its progeny would therefore be the more able to resist the attacks of *Peronospora* in our moist climate. But by the lowering of its status to that of a variety it is now thought that its disease-resisting power will not be so efficacious as

it at first was conceived to be. However a few years will decide the matter.

At the instigation of Lord Cathcart the Messrs Sutton of Reading have experimented and have been able to procure a good many crosses between it and some of our best quality potatoes. They found that when the polen of *Maglia* was applied to the stigma of a potato flower, it at once influenced the stile whereon it was applied, and also when the cross was the other way, the influence was the same which showed the near relationship betwixt the two. At the time they were conducting these experiments, they experimented also with *Jamesi*, but with it they were not so successful as they were with *Maglia*, which proves it to be of a more distant relationship. I think, so far as my memory serves me, that, after operating upon some hundreds of flowers, only the berry of this cross swelled and ripened seed. It will be more interesting to watch what the results of this cross will turn out to be, than will be that of *Maglia*, because these are true hybrids, whereas those obtained between *Maglia* are cross-breds only.

That the first cultivators are lost in antiquity, is equally as true of the potato as it is of any of the cultivated cereals. Accident, might first lead to its use, and necessity afterwards to its cultivation. No Nomadic race, in the far past ages, would ever think of cultivating any plant when it could be got of nature's culture for the gathering. But, when once they would settle down into communities, the wildings would soon disappear, through over-gathering, and man, to keep himself in existence, would have to till the soil, and plant, before he could eat. It is a recorded fact, that the potato had been cultivated in Peru for ages before the Spaniards first visited it in the sixteenth century, for it then was one of the staple food products of that country. A nation — the Chibcha — whose language is now extinct, has left ample evidence behind them in vocabularies, that prove them to have been well acquainted with this estimable tuber, and to have raised and cultivated several varieties, designated by different names. Their mode of culture may have been primitive, nevertheless, it was a success, when we think of the rude appliances they would have to work with, at so remote a period. That the potatoes brought first to this country were cultivated varieties and not a wild species is, doubtless true. For, "in 1693 Sir Robert Southwell, president of the Royal Society,

communicated to that learned body the fact that his grandfather first cultivated the potato in Ireland, and that he obtained it from Sir Walter Raleigh," which must have been within a few years after its introduction. Raleigh was executed in 1618, but he had been imprisoned for twelve years previously, which, goes to prove that the first introductions were descended from a cultivated stock. The year after Raleigh's death, "a small dish of them provided for the Queen's table cost 1s per lb." At the same money value what would they cost now? It is not said at what season of the year this occurred, but we will take it for granted that it was in their regular season, for forced potatoes would not be dreamed of at that time.

According to Dr Ischardi, the best variety of potato cultivated in Peru is called *Papa amarilla.* "It is small and round with a thin white skin, and when bisected the colour is a clear bright yellow." There are other sorts which he says are very well flavoured, but this one is most in demand in the markets there. Mr Ap-Thomas, who had resided in Peru for a considerable time, says, that three varieties were principally grown from the coast up to 8000 feet elevation. The yellow potato was the principal one. The potato disease he had neither heard of nor seen while he stayed in Peru.

"England's happiness increased, or a sure and easy remedy against its succeeding dear years, by a plantation of the roots called potatoes, whereof (with the addition of wheat flour) excellent, good, and wholesome bread may be made every year, eight or nine months together, for half the charges as formerly. Also, by the planting of these roots, 10,000 men in England and Wales, who know not how to live or how to get a maintenance for their families, may, off one acre of ground, make £30 per annum. Invented and published for the good of the poorer sorts, by John Forster, gent., of Harslop, in Buckinghamshire," is the title of a pamphlet published in 1664, being the first ever devoted to the subject in the English language. He recommends the Irish potatoes for general cultivation, also, a well-drained soil, and manure, if necessary; he also explains how to raise new varieties from the seed. He then considers its political aspect, and recommends the king "To order an importation of the root from Ireland, and that every man in every parish shall grow an acre or two; and that, out of every £30 worth grown in the parish, £5 shall be paid to the King!" and concludes with di-

rections for making potato bread, potato biscuits, potato pudding, potato custards, and potato cheesecakes. More than 200 years have passed away since that publication was penned setting forth the potato in such glowing terms as a remedy against dear years, which remedy has not yet been arrived at in potato cultivation, nor, I am afraid will it ever be. Man requires something more than potatoes to live upon, for, although they generate fat they are very low in muscular forming substances. The average composition of the potato in its natural state, according to Fresenius, is as follows—albumen, 2·43, starch, 15·00, gum and organic acids, 3·30, fatty matters, 0·10, fibre, 7·00, asparagine, 0·10, ashes, 0·97, water, 71.10. A food that in its natural state consists of 71 per cent. of wtter, and only about 2½ of muscular forming ingredients is not the best of food to support a man that has hard toil. Although potatoes make a good dietary substitute for cereals, they ought never to be used to the entire exclusion of the latter which is far more nutritious as an article of food. To the small amount of nitrogenised matter that the potato contains is generally attributed the disinclination of the Irish peasant who lives almost upon a potato diet to hard manual labour. The same principle holds good in whatever clime or race where there are large consumers of potatos without an abundance of milk along with them. The race from which I have sprung—the Highland crofters, are said to be "big lazy fellows" when a too often use of the potato as a diet may be the cause of it, leaving a sort of inert feeling in them. Transplant them from their native soil to where their mode of living is changed, and where can be found a race more hardy, enduring and persevering than they?

The annual general meeting of the Society was held in the Smith Institute, on Tuesday evening, the 4th October—the Rev. Mr Goldie in the chair. The minutes of September meeting having been read and approved of, Mr Sinclair, secretary, and Mr Daniel Ferguson, National Bank, treasurer of the Society, submitted their reports for the year ending October 4th, 1887. These were to the following effect :—

SECRETARY'S REPORT.

The meetings of the Society have been regularly held during the year, many interesting papers have been read and the attendance on the whole has been satisfactory. The number of the members and associates remains much the same as last year. A few new members have been elected, but it is very desirable that a few energetic younger members would join the Society. The first matter which required the attention of the Council at the beginning of last year, was to raise funds to pay off the deficiency which unfortunately occurred in connection with the Gilchrist lectures. It being considered that it would not be right to take any of the funds of the Society for this purpose, the members of the Council subscribed a sufficient amount to clear off the debt which had been incurred. A copy of "The Official Year Book of Scientific and Learned Societies of Great Britain and Ireland," having been procured, the Council were enabled to send copies of their transactions to a number of similar societies from several of which we have received acknowledgments, and from others copies of their transactions. These with the other books belonging to the Society, the Council have resolved to make accessible to the members, and Mr Sword, has kindly agreed to act as librarian. The Council, therefore, recommend that Mr Sword, be appointed librarian with a seat in the Council. In consequence of the interest caused by the paper read by Dr Drew, on the Heading Stone, many of the members took a considerable interest in the matter, and as you are all aware the stone has now been placed on the Mote Hill, and the custody of it handed over to the Municipal Authorities. As it is probable that there may be something interesting near the foundation of the building, which evidently has existed on the summit of the Mote Hill, application has been made to the office of Her Majesty's Woods and Forests for leave to make an excavation there, and one of the members has undertaken either to pay

the expense of the excavation or to raise sufficient funds to do so. The last matter which has engaged the attention of the Council has been the necessity of raising some funds for the purpose of providing additional glass cases for the Museum. There are many specimens of both Archæology and all the branches of Natural Science of the greatest local interest, which cannot be seen for want of proper places in which to exhibit them, and an appeal will probably soon be made to a generous public to supply the necessary funds.

TREASURER'S REPORT.

Balance from last account,.....	£0	13	11½	Paid printing and advertising,.....	£5	18	6
Subscriptions received.....	10	8	0	British Moss Flora section IV.,.....	0	10	6
Transactions sold,.	0	13	0	Cooke's British Dermids, 6 parts,	1	4	0
Donation received,	0	5	0	Crawford & Mackay, for maps,...	0	12	0
				Year book of learned & scientific societies,...	0	6	0
				Fire, gas, and use Museum Room,..	1	10	0
				Cleaning, lighting, & arranging room for meetings,....	1	0	5
				Paid postages and incidents,.....	0	13	0
				Balance on hand to next account,....	0	5	11½
	£11	19	11½		£11	19	11½

The Secretary and Treasurer's reports were unanimously adopted by the meeting, after which Mr Goldie, according to time-honoured precedent, read his retiring address as President of the Society.

PRESIDENT'S ADDRESS.

The Rev. W. F. GOLDIE, the retiring President, apologised for not being prepared with a regular address, and craved the indulgence of the meeting in the few remarks he had to make. He said—During the past session we have had ten papers, four of which were on local and six on general subjects, but none of them without a bearing on local investigation and studies. Four of these papers were in the department of Natural History, and the remainder might be regarded as comprehended generally in the department of Archæology. It is manifest from this that the former department should receive a little more attention than it has done. I am not including my own contribution when I say that these papers were most creditable to their respective

authors. And we have not been so dependent upon foreigners as formerly, for all the contributors of the past year were members of the society, a fact very much to our credit, as also holding out good hopes for the future. No doubt modesty is a virtue, but it is carried too far when it deters from good works. Or rather there is a difference between modesty and *blateness*, for whereas the former may do much good work and do it well, the latter never does anything but colour up in a rather foolish fashion. I would fain hope we are all modest, and none of us *blate*. But how are we to account for the absence of work on the part of many of our members? Perhaps they are so far above the level of the fountain head as not to receive so much knowledge that it can flow over. Let us hope, however, that they will come to a level with some of us some day, and find an outlet for what they have. At any rate there does not seem to be a sufficient value set upon facts, on which all real science is founded. No fact is without real value, and if so, no fact should alarm us unless it be immoral or irreligious. The fact existed, and we were safe enough before we were aware of it, and we are in no greater danger after it is discovered. No one is afraid of facts unless he be ignorant, or prejudiced, or sceptical regarding that which he persuades himself he firmly believes. It was the neglect of facts, and the pursuit of preconceptions, that so long hindered the advancement of science. Lord Bacon's philosophy, to put it in the simplest form, is—begin with facts, collect them, and from comparison and contrast come to your conclusions. The power of observing facts and estimating them at their true value constitutes the difference between the discoverer or inventor and other men. The simplicity of discovery and invention is sometimes wonderful. The world says anybody could have seen or done that, if it had just been thought of. Anybody could see an apple fall, but it was only a Newton, who saw in it the hint of the law of gravitation. Anybody could notice that a spinning wheel revolved for a time after it was overturned, but it was only an Arkwright, who saw in it the hint of the spinning jenny. According to popular story people said to Columbus, that anybody could have discovered the Western Continent. He proposed that they should make an egg stand on end without anything to make it stick or to support it. His friends tried and failed. He took up the egg and striking it gently upon the table made it stand, when his

friends exclaimed, "Anybody could do that." Columbus, replied, "Why did you not do it then?" The application of the story was manifest. Many competent persons are deterred from the pursuit of science, by the idea that its attainments are beyond their reach, but they are not asked to stand by a bound at the top of the ladder, without the aid of the intervening steps. They must begin with the simplest facts and proceed step by step to the summit, or to an elevation at least. My old professor in Natural Science, the distinguished naturalist, Dr John Fleming, insisted on two things. 1. Collect facts and be chary of speculation. One Saturday, a company of us students were on a geological excursion with him, when we came to a freestone quarry, where on one side of it the stone had been raised from a horizontal to a vertical position, having a seam of coal between the layers. One student asked abruptly how he accounted for a thing so uncommon, when the Dr coolly and dryly requested the student to mark the fact, and explain it when he was able. He was very chary of conclusions lest they should be premature or groundless. He had a case of star fish and when Buckland and Agassiz visited him, they declared they could tell the zone in which any of them had lived from certain characteristics. They rightly declared that several specimens were tropical, "And this (said Fleming, handing a specimen to them) what zone does it belong to?" "Clearly the torrid zone," chimed in the two savants. "Well (said Fleming, dryly), that specimen was fished up by Scoresby at the North Pole." He was as cautious as Cuvier, a much greater man, who, when an enthusiastic student came to him one day declaring he had made a discovery, in regard to a certain vine, advised the young man to study the subject and come back and talk to him about it six months thence. At this moment we have the Duke of Argyll showing that while Darwin's theory of the formation of the coral islands covered all the facts of the case known at the time, the discoveries of the Challenger Expedition have brought such new facts to light that a new theory is required to explain how the islands were formed. A fact is one thing and the explanation of a fact is another thing. We must cross every chasm on a bridge of fact, for if we leap the chasm we may prove our agility but find ourselves in a trackless waste on the other side. 2. Fleming's other principle, or rather rule, was one which may be regarded as trite were it not so often set aside.

It was this: always seek to explain the less known by the better known facts, never *vice versa*. Hence he approached geology by dwelling on the objects we see and the forces in operation at present on the surface of the globe. And having done this he went below the surface and made the science of geology more clear and certain than it would otherwise have been. Of course the rule is applicable to almost all kinds of study—and if it were more generally followed, we should have far less of the haphazard and the uncertain. The necessary equipment for the understanding and explanation of facts is an unbiassed, well trained, well informed mind, an equipment which our theorists frequently lack. To hug our prejudices and dogmatise as if we knew everything betrays the absence of the scientific spirit, which is always modest, always open to correction, and always submissive when it is proved to have been mistaken. When our minds are closed to further evidence our scientific progress has come to an end, and we may be occupying the position of the Frenchman who, on being told that facts were against a theory he had propounded, exclaimed with energy—"So much the worse for the facts." No theory is tenable unless it contain all the known facts, and is capable of being modified or re-cast by newly-discovered facts. A young gentleman fell heir to an estate and a mansion with a valuable library. He ordered bookcases to be made according to a certain plan, but when they were finished the cabinet wright informed him that a number of rare old folios were too long for the shelves, and desired to know what should be done with them. The young gentleman was a philosopher and instructed the wright to saw as much off the ends of the volumes as would let them into the shelves. This was done, and the library looked beautiful. It was a good illustration of cutting your facts to suit your theory, instead of forming your theory according to your facts. But not being prepared with a regular address, I have just been saying what came first and uppermost, and so have wandered from my point. What I was aiming at when I began was to show the value of facts, and our need of them as a society, and that good work would be done by observing and collecting facts even though we should be unable to give a scientific explanation of them, or unable to regard ourselves as scientists. Every new fact observed, studied, and recorded is a step in advance; and going on in that way you may find yourselves scientists

without having been aware of it. But of course you must begin. And in order to give every one an opportunity of beginning, and at the same time add to the stores and efficiency of our society, I would suggest that we have an evening now and again to discuss the merest notes of observation or the merest questions that may be handed into the Council. If our members would but take the hint, and there is no member but could act upon it, we might now and again have a lively and profitable meeting. Scarcely any fact would be out of our beat. Let us have one trial at lest.

Mr Kidston, in moving a vote of thanks to Mr Goldie, for his excellent address, heartily approved of the suggestion regarding meetings to be entirely devoted to conversational discussion on points of Archæology, Natural History and other subjects connected with the Society, and he hoped the Council would put the suggestion into effect, and arrange for several such meetings during the year.

The names of the following gentlemen were on the recommendation of the Council submitted to the meeting, and these were unanimously elected office-bearers of the Society for the ensuing year:—

Presidents.

Colonel MURRAY of Polmaise.
Colonel STIRLING of Gargunnock.

Acting President.

Rev. WILLIAM F. GOLDIE.

Vice-Presidents.

Mr J. A. HARVIE-BROWN of Quarter.
G. T. GALBRAITH, M.D.

Treasurer.

Mr D. FERGUSON, National Bank.

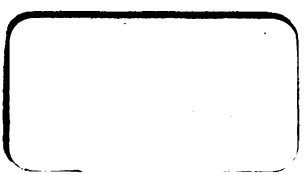
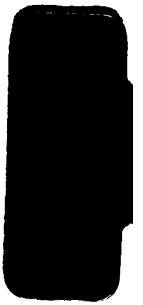
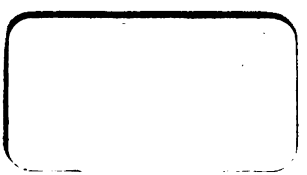
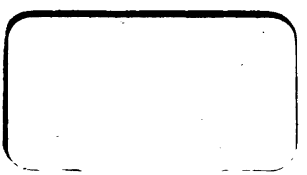
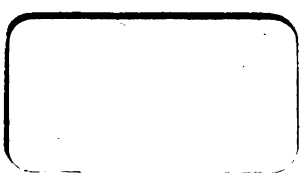
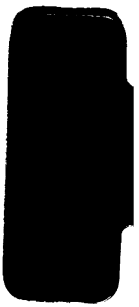
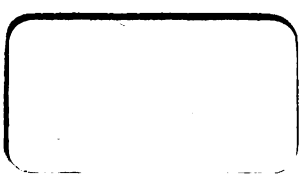
Joint Secretaries.

Mr R. KIDSTON, Victoria Place.
Mr J. B. SINCLAIR, Clarendon Place.

Librarian.

Mr SWORD, Smith Institute.

Council.

Dr DREW, Albert Place.
Mr J. W. SMALL, Wallace Street.
Mr A. MOYES, Douglas Teerace.
Mr A. ALLAN, Cliff Bank.
Rev. J. M. ROBERTSON, St Ninians.
Mr A. M'LELLAN, 3, Royal Gardens.

Votes of thanks to Mr Sinclair, secretary, and to Mr Ferguson, treasurer, for their admirable conduct of the Society's affairs during the past year, concluded the business of the evening.